THE EFFECT OF CURRICULUM BASED MEASUREMENT, STUDENT CONSULTATION, AND GOAL SETTING ON RELATED STUDENT READING OUTCOMES AND DURATION OF DAILY READING INSTRUCTION FOR STUDENTS WITH INTELLECTUAL DISABILITY

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Students with intellectual disability (ID) have continued to struggle with reading achievement despite recent accountability measures and high academic expectations for all students. Several researchers have started to explore the use of phonics based reading interventions with students with ID and the results are promising. The purpose of this study was to extend the previous research on phonics based reading interventions by examining the effects of teachers' use of reading curriculum based measurement (CBM) combined with student consultation and goal setting on related student reading outcomes and amount of provided daily reading instruction. Teachers were trained to administer CBM and also learned to interpret CBM data so they could monitor reading goals and make appropriate instructional changes for participating students. Three teachers administered weekly CBM to four eligible students with ID and monitored data for 16 consecutive weeks. Participating teachers consulted with each participating student weekly to share previous CBM scores, provide encouragement and to highlight weekly reading goals. A multiple baseline across participants design was used to display and interpret visual data. Findings revealed that all four students increased his or her weekly reading fluency and accuracy but there was no functional relation established between intervention and improved reading across students. However, weekly minutes of reading instruction increased during

intervention for three of the four students. Directions for future research are discussed, as are limitations and implications for practitioners.

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PREFACE

In memory of Dr. Everett William Hill Jr.

The last four years at Pitt have been an amazing experience filled with both personal and professional growth. Completion of my dissertation would not have been possible without guidance from my committee and support from my family.

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1.0 INTRODUCTION

It is estimated that during the course of a day, the average person reads a few thousand words (Smith, 1992). The ability to read enables individuals to interact with not only the environment but also with one another. Reading is a critical life skill that is first developed during early childhood and refined through formal education. The role of formal education is critical to most students' reading development; unfortunately, some students struggle to acquire reading skills and others never learn to read (Chall, Jacobs, & Baldwin, 1990).

Multiple methods of reading instruction (e.g. whole language, basal) have been implemented in schools throughout the years with varying degrees of success (Stahl, Hester, & Stahl, 1998). However, one method of reading instruction reported in an array of research to be beneficial for beginning readers is phonics. Systematic phonics instruction is evidence based and an effective method for helping struggling students acquire reading skills (Chall, 1996; National Reading Panel, NRP, 2000). Phonics instruction systematically emphasizes and teaches students how to decode words independently, a skill that contributes to increased oral reading fluency. However, before students can decode words successfully, they master the alphabetic principle, an understanding that letters and combinations of printed letters are used to represent the sounds in spoken language (e.g., in English, 44 sounds made by 26 letters). Once the alphabetic principle is mastered, students can use this knowledge to decode novel words. Research supports the use of systematic phonics instruction with struggling readers and with students who have or

are at-risk for developing learning disabilities (Adams, 1994; Bear & Barone, 1989; Chall, 1996; Stanovich, 1991; Stahl & Murray, 1998).

Research supports the efficacy of phonics instruction for struggling readers and students with milder disabilities (i.e., LD), however questions remain about the efficacy of phonics instruction for students with intellectual disability (ID) (Joseph & Seery, 2004). Traditionally, students with ID have been excluded from phonics based reading intervention studies as a result of various challenges (i.e., cognitive and behavior deficits) and antiquated beliefs (Finnegan, 2012).

For years, the preferred method of reading instruction for students with ID has focused on drill and practice instruction of sight words and basic vocabulary (Barudin & Hourcade, 1990; Browder, Hines, McCarthy, & Fees, 1984; Browder & Lalli, 1991; Katims, 2000). Based on multiple studies examining the effect of sight word instruction for students with ID, researchers concluded that students with ID are capable of learning reading skills through sight word instruction (Browder, Wakeman, Spooner, Ahlgrim-Delzell, & Algozzine, 2006; Erickson & Koppenhaver, 1995; Kliewer & Landis, 1999). Nevertheless, two significant limitations associated with sight word instruction are the inability for students to generalize reading skills to nontaught words and the poor generalization to reading connected text (Browder, 2006). Despite both significant limitations, the sight word approach is still implemented in classrooms serving students with ID (Allor et al., 2013).

Over the past 10 years, special education as a field has experienced change in the type of services provided to students with disabilities. Accountability and high academic achievement standards for all students including those with disabilities, have increased expectations for students' outcomes and schools' abilities and responsibilities for ensuring that adequate progress

is maintained (IDEA, 2004). Accountability measures are a direct result of new education policy written over the past decade (i.e., No Child Left Behind Act, 2001). For example, NCLB mandates that educators focus instruction on academic achievement standards regardless of students' disability. Thus, special education teachers of students with ID can no longer restrict instruction to functional skills (Sievers, Ayres, Douglas, & Lowrey, 2011). This emphasis on academic accountability and an increase in societal expectations for students with ID has led some practitioners and researchers to investigate whether phonics-based approaches to reading instruction may be beneficial for students with ID (Joseph & Seery, 2004).

Although phonics based reading interventions hold promise for this population of learners, educators must identify a student's specific reading deficit before providing appropriate instruction. One such method of identify student reading deficits is through progress monitoring. Progress monitoring is a scientifically based practice that has been used effectively with students struggling academically (Quenemoen, Thurlow, Moen, Thompson, & Morse, 2004). Data accrued from the progress monitoring is used to evaluate students' academic performance within the context of the classroom curriculum. One form of progress monitoring that has been effective with struggling students over the past 30 years is curriculum-based measurement (CBM).

Designed by Deno (Deno, 1985) in the 1970s, CBM provides practitioners a progress-monitoring tool to identify academic deficits in struggling learners. CBM is a reliable, valid and inexpensive informal assessment administered weekly that measures each student's progress towards end of the year benchmarks in reading. Because CBM is derived from grade level curriculum, the majority of extant CBM studies involve researchers implementing CBM to students in general education and/or to students with milder disabilities (i.e. learning disabilities). The focus on students with milder disabilities and students in general education has created a gap

in the literature base for CBM use with students with ID (Wallace, Ticha, & Gustafson, 2008). Additionally, the current lack of adapted grade level curricula for students with ID has made many researchers hesitant about examining the effects of CBM implementation to this particular population of students.

A small number of studies examining the use of CBM with students with ID have been published over the past 10 years. Researchers of two notable studies (Tindal, McDonald, Tedesco, Glasgow, Almond, Crawford, and Hollenbeck, 2003; Wallace and Ticha, 2007) examined the use of CBM to help supplement large-scale formal assessments and reported successful outcomes. Both studies contribute to the research base and serve as the first steps towards developing a reading progress monitoring tool for students with ID. However, neither group of researchers explored the relationship between CBM and reading instruction. Additional research in this area is needed.

Attempting to fill the gap left by the previous studies, Lemons et al., (2013) examined relationships between early grade CBM performance and the alternate assessment based on alternate academic achievement standards (AA-AAS). Special education teachers in one Northeastern state administered CBM concurrently with the alternate assessment to a large sample (n=7,440) of students with significant cognitive disabilities (i.e. eligible for the AA-AAS) in grades 3 through 8 and 11. Teachers were able to administer CBM with high fidelity and scores on the measures accounted for significant variance on the AA-AAS. The authors suggested that early grade reading CBM may be useful for special education teachers to monitor the progress of students who participate in the AA-AAS. A limitation to the study was the lack of continuous CBM administration throughout the school year. Results were based on data collected from a single CBM session for each participant.

Results reported by authors of all three studies (Lemons et al., 2013; Tindal, McDonald, Tedesco, Glasgow, Almond, Crawford, and Hollenbeck, 2003; Wallace & Ticha, 2007) support the benefits of CBM use with students with ID. However, all three studies provide little insight into the effects of continuous use of CBM on reading instruction for students with ID.

2.0 LITERATURE REVIEW

Accountability measures, limitations associated with sight word instruction, and successful reading outcomes associated with phonics instruction on students with milder disabilities have prompted some researchers to start examining the effects of phonics instruction for students with ID. Using systematic phonics reading instruction for students with ID is a fairly new concept (Katims, 2000) and whether it is a viable method of reading instruction for students with ID has yet to be determined. Currently, research focusing on phonics base reading interventions for students with ID is limited but two reviews on the use of phonetic analysis with students with ID have been written over the last 25 years.

Conners (1992) conducted the first review of studies evaluating the effect of phonics-based instruction for students with ID. She reviewed seven studies occurring in the 1970s through the 1980s that examined the efficacy of phonetic approaches to teaching reading to children with ID. Based on seven studies, Conners concluded that children with moderate ID could benefit from phonics instruction. Of the seven studies reviewed by Conners, authors of two studies (Hoogeveen, Smeets, & Lancioni, 1989; Hoogeveen, Smeets, van der Houven, 1987) reported positive outcomes on letter-sound acquisition by students with ID when a stimulus-connected prompt fading technique was implemented. Authors of two other studies (Singh & Singh, 1985; N.N. Singh & Singh, 1988) in Conners's review reported the benefits of using phonics analysis with error correction to help students with ID reduce word recognition errors

over time. Two additional studies (Bracey, Maggs, & Morath, 1975; Gersten & Maggs, 1982) in the review, authors reported the efficacy of DISTAR on students with ID sounding out words and blending sounds. The final study (Nietupski, Williams, & York, 1979), authors examined a comprehensive program that included a phonetic-analysis component and positive results were reported on students' word analysis skills.

The most recent review of the literature pertaining to phonics based reading interventions for students with ID was published in 2004 (Joseph & Seery, 2004). The review included studies implemented between 1990 and 2002 with a focus on phonetic-analysis strategies and/or phonics instruction. Of the seven studies reviewed by Joseph & Seery, researchers of one study (Hendrick, Katims, & Carr, 1999) examined the effectiveness of a comprehensive literacy program that used embedded phonics instruction. Authors of two other studies (Lane & Critchfield, 1998; Kabrich & McCutchen, 1996) implemented computer-assisted instructional approaches and one group of researchers examined phonics instruction through error-correction procedures (Barbetta, Heward, & Bradley, 1993). Baruden & Hourcade (1990) examined letter-sound correspondence acquisition for students with ID and authors of the last two studies (Calhoon, 2001; Gottardo & Rubin, 1991) in the review used comparison groups (i.e., students with disabilities and students without disabilities) to analyze student performance on various reading skills.

2.1 PURPOSE OF THE REVIEW

The purpose of the Joseph and Seery review was to update the review written by Conners in 1992. Joseph and Seery (2004) reported seven studies over a 12-year period consisting of the use

of phonetic analysis with individuals with ID and concluded that students with ID can benefit from some form of phonics instruction. Ten years have passed since the Joseph and Seery review was published. Thus, the purpose of this review was to update the prior review by Joseph & Seery and examine studies over the past 12 years that have implemented phonics based reading interventions to students with ID to answer the following questions:

1. With whom and in which types of education settings has phonics instruction been evaluated?
2. Which approaches to phonics instruction have been examined since the last review?
3. How effective are explored phonics interventions for students with ID?
4. Is there evidence for an increased focus on phonics instruction for students with ID since the previous reviews?

2.2 METHODS

Search procedures consisted of three steps. First, a literature search using three online databases (i.e., PsycINFO, PsyArticles, and ERIC) was conducted using all truncations of the following descriptors *intellectual disability, mental retardation, developmental disabilities, cognitive disabilities, educable handicapped, trainable handicap, profound handicap, phonics, phonics instruction, phonic strategies, word identification, word recognition, letter-sound association, basic reading skills, reading, and reading instruction*. Second, an ancestral search was conducted on all identified articles and reviews (i.e., Conners, 1992; Joseph & Seery, 2004). Third, the following journals identified in the previous review by Joseph and Seery were hand searched: *American Journal on Intellectual and Developmental Disabilities, Focus on Autism and Other*

Developmental Disabilities, and Journal of Applied Behavior Analysis. To meet criteria, all articles had to:

1. Use an empirical design (i.e., a single subject, experimental or quasi-experimental design). Qualitative and descriptive studies were excluded (e.g., Wise, et al., 2010).
2. Be published in an English-language, peer-reviewed journal between 2001, end-date for the most recent review (Joseph & Seery, 2004), and 2013.
3. Include participants between the ages of 6 and 21 years who were identified as having ID.
4. Evaluate the effectiveness of a reading intervention that consisted of printed text in the form of phonics or letter-sound correspondence. Sight word and descriptive studies were excluded (Mechling, Gast, & Krupa, 2007; Joseph & McCachran, 2003).

The initial computerized search produced 805 articles of which 8 met criteria. An ancestral search of all articles meeting the inclusion criteria produced three additional studies for a total of 11. The hand search of the *American Journal on Intellectual and Developmental Disabilities, Focus on Autism and Other Developmental Disabilities, and Journal of Applied Behavior Analysis* failed to identify additional articles that met criteria. The resulting 11 articles meeting criteria (Allor, Mathes, Roberts, Cheatham, & Champlin, 2010; Allor, Mathes, Roberts, Jones, & Champlin, 2010; Bradford, Shippen, Alberto, Houchins, & Flores, 2006; Browder, Ahlgrim-Delzell, Flowers, & Baker, 2012; Cohen, Heller, Alberto, & Fredrick, 2008; Conners, Rosenquist, Sligh, Atwell, & Kiser, 2006; Finnegan, 2012; Flores, Shippen, Alberto, & Crowe, 2004; Fredrick, Davis, Alberto, & Waugh, 2013; Joseph, 2002; Waugh, Fredrick, & Alberto, 2009) were found in eight journals.

2.3 RESULTS

The results for this review are organized into four sections. The first section contains the number of participants in the studies and the settings in which the interventions were evaluated (i.e., self-contained classroom, pullout classroom, other setting, or unknown). The independent variable used in each study is identified in the second section. The third section focuses on the purpose and experimental design used in the studies and the fourth section contains descriptions of the dependent variables included in each study.

Table 1: Phonics Based Reading Interventions for Students with ID

Study	Intervention	*n*	Age	Setting	Design	DV	Outcomes
Allor et al. (2010)**	Hybrid Reading Intervention -DI	34	8-10*	DNR	Random Experiment	*PPVT-III, EVT, WLPB-R, CTOPP, TOWRE*	*CTOPP* Segmenting Words, *WLPB-R* Letter-Word ID
Allor et al. (2010)**	Hybrid Reading Intervention -DI	16	8-10*	DNR	Random Experiment	*PPVT-III, EVT, WLPB-R, CTOPP, TOWRE*	*CTOPP* Segmenting Words, *WLPB-R* Letter-Word ID
Bradford et al. (2006)**	Corrective reading Program	3	12-15	Regular Class	Quasi-Experiment Pre-Post	Word reading	50% of fluency measures mastered
Browder et al. (2012)^	Early Literacy Skills Builder	93	K -5th graders	Regular Class	Random Experiment	Nonverbal Literacy assessment & *PPVT*	*ES* = PhonSK (.44)
Cohen et al. (2008)**	Simultaneous Prompting	5	9-14	Pull-Out Class	Multiple Probe	Words read/sounded out/decoding	All participants met criteria
Conners et al. (2006)**	Edmark	20	7-12	DNR	Quasi-Experiment Pre-Post	Sounding Out	Significant main effect for group
Fredrick, et al. (2013)^	*Initial Phonics* with Simultaneous Prompting	5	7-14	Regular Class	Multiple baseline across sets	Word analysis skills	Functional relationship established between IV & DV
Finnegan (2012)**	Synthetic Phonics	52	5-12	Regular Class	Random Experiment Pre-Post	Woodcock Johnson III	*ES* = .542 (Synthetic v. Control)
Flores et al. (2008)^	Corrective Reading Program	6	8-13	Regular Class	Alternating Treatments	Single letter ID	All participants met criterion of 100%
Joseph (2002)**	Word Boxes &Word Sort	3	9-10	Pull-Out Class	Multiple Base Line Across Participants	Correct words read	Reading accuracy for all participants>90%

Waugh et al. (2009)^	Simultaneous Prompting	3	9-11	DNR	Changing Criterion	Letter Sounds	Mastery of letter-sound

Note. ID =intellectual disability; DV = dependent variable; DI = direct instruction
*Age of participants is approximate; study involved students in grades 1-4
** Denotes researcher implemented intervention.
^ Denotes Classroom teacher implemented intervention.

2.3.1 Participants and Settings

From the 11 studies, there were a total of 240 participants with ID. The ages of the participants in single subject designs ranged from 7 to 14 years (M = 10.3, SD = 3.79). A mean age for participants in the control trials was unavailable because ages of the participants in each study were presented in an age range (i.e., 6-15). Participation in the studies reviewed had a range of 3 to 93 participants (M = 8.6, SD = 9.37). The high standard deviation is a product of the variation in experimental designs that were implemented throughout the 10 studies.

Settings varied across studies with authors of five studies (Bradford et al., 2006; Browder et al., 2012; Finnegan, 2012; Flores et al., 2004; Fredrick et al., 2013) evaluating interventions within the participants' classroom (i.e., self-contained classroom). Researchers for two studies (Joseph, 2002; Cohen et al., 2008) reported providing interventions to participants outside of their special education classroom in alternate classrooms away from peers. Researchers for the remaining four studies (Allor, Mathes, Roberts, Cheatham, et al., 2010; Allor, Mathes, Roberts, Jones, et al., 2010; Conners et al., 2006; Waugh et al., 2009) did not explicitly report the location of intervention delivery.

2.3.2 Interventions

For this review, interventions will be described in three groupings based on common characteristics. Three types of interventions were examined and included (a) researcher-designed approaches that incorporated various aspects of systematic, explicit instruction; (b) published reading curricula (e.g., *Corrective Reading*); and, (c) interventions based on well-established behavioral principles (e.g., simultaneous prompting).

2.3.2.1 Researcher-designed interventions.

Examining the 11 studies, authors of six studies reported the use of systematic explicit instruction intervention targeting multiple reading skills (Allor, Mathes, Roberts, Cheatham, et al., 2010; Allor, Mathes, Roberts, Jones, et al., 2010; Bradford et al., 2006; Browder et al., 2012; Conners et al., 2006; Flores et al., 2004). In two of the studies (Allor, Mathes, Roberts, Cheatham, et al., 2010; Allor, Mathes, Roberts, Jones, et al., 2010), researchers constructed a systematic explicit reading program based on behavior principals associated with direct instruction (DI) that focused on concepts of print, phonological and phonemic awareness, oral language, letter knowledge, word recognition, vocabulary, fluency, and comprehension. Each participant received the intervention for 40-50 minutes daily in small groups (1-4 students per group) from special education teachers hired specifically for the study. The first study (Allor, Mathes, Roberts, Jones, et al., 2010) was conducted for a year and a half and the second study (Allor, Mathes, Roberts, Cheatham, et al., 2010) lasted for three years. Browder and colleagues also conducted a large-scale study to evaluate the effectiveness of a multicomponent early literacy curriculum (Browder et al., 2012). The treatment group received the *Early Literacy Skills Builder* (ELSB) intervention targeting vocabulary,

comprehension, phonemic awareness and early phonics skills. Instructional interventions were implemented to participating students for an entire school year but the authors did not report the amount of daily minutes or number of sessions students were exposed to the intervention. However, all reading interventions were implemented by the classroom teacher and monitored for fidelity.

2.3.2.2 Published reading curricula.

In two studies (Bradford et al., 2006; Flores et al., 2004), researchers examined the effectiveness of *Corrective Reading Program Decoding A* (Engelmann, Carnine, & Johnson, 1988), an established systematic, explicit reading program with a focus on decoding skills. Bradford et al., (2006), conducted lessons three days a week for 45-55 minutes per session and the intervention was delivered by the first author for six months. Flores et al. (2004) modified the corrective reading program by removing the letter *e* due to its aesthetic similarity to the letter *a* and also introduced the letter *m* before the letter *a* because the participants had learned the letter *a* prior to the study. The classroom teacher was trained and implemented the intervention with six participants in a small group setting three times a week for approximately three months.

Gunters and colleagues (2006) evaluated the Edmark reading program that combined systematic computer based lessons with scripted paper and pencil exercises. The intervention targeted sound blending, letter-sound association, and sounding out skills. Instructional sessions ranged from six to nine lessons per reading skill and were administered by the researcher one to one with each participant. Sessions typically lasted for 10-20 minutes three times a week for approximately 8-11 weeks.

2.3.2.3 Behavioral based interventions.

The remaining five studies (Finnegan, 2012; Fredrick et al., 2013; Joseph, 2002; Cohen et al., 2008; Waugh et al., 2009) in this review consisted of trained personnel implementing systematic explicit instruction. In three of the studies (Joseph, 2002; Cohen et al., 2008; Waugh et al., 2009), the authors also incorporated a behavioral or manipulative component within their respective interventions. Frederick et al., (2013) implemented an intervention consisting of *Initial Phonics* and simultaneous prompting. Finnegan, (2012), implemented two interventions within her experimental design, (a) synthetic phonics, and (b) analogy phonics. The synthetic phonics intervention consisted of participants learning individual letter sounds and how to blend them to make words. The analogy phonics consisted of participants learning sounds of common consonants and common "rimes" and combining both to read words. Each treatment group received 12 phonics instruction sessions for 15-20 minutes that consisted of letter sounds and words being presented on printed cards. Participants were asked to practice reading the words and saying the letter sounds before attempting to match pictures with the sounds/words. In two studies (Cohen et al., 2008; Waugh et al., 2009), researchers incorporated a behavioral component by implementing simultaneous prompting as an intervention. Simultaneous prompting is an instructional strategy used in teaching sight words to students with ID. The strategy involves the simultaneous delivery of the controlling prompt and the instructional cue (Wolery, Ault, & Doyle, 1992). Waugh et al., (2009) extended on the research conducted by Cohen et al., (2008) by increasing the duration of the simultaneous prompting intervention on acquisition of letter-sound correspondences and blending skills of previously taught words over the span of two school semesters.

The author of the final study (Joseph, 2012) used a word box method of reading instruction that consisted of three steps. First, a rectangle on magnetic boards separated into three connected boxes was constructed prior to intervention. The instructor slowly read a single word to the student and placed a counter under each box as each sound of the word was said. The student was then prompted to place the counters under the correct boxes as the word was spoken. Next, the student was presented with individual letters of the word and was prompted to say the sound of each letter as he or she placed the letters in the appropriate boxes. The final step in the intervention consisted of the student writing the appropriate letter in the each box as he or she said the sound.

2.3.3 Experimental Design

2.3.3.1 Group Designs.

Researchers implemented group designs (i.e., Randomized Control Trial [RCT] or quasi-experimental designs) in six studies. Four studies involved a RCT (Allor, Mathes, Roberts, Cheatham, et al., 2010; Allor, Mathes, Roberts, Jones, et al., 2010; Browder et al., 2012; Finnegan, 2012) of the 10 studies. Two studies (Bradford et al., 2006; Conners et al., 2006) consisted of a quasi-experimental design. Authors of the six RCT and quasi-experimental studies reported means and standard deviations on pre and posttests for both treatment and control groups and all but one study (Bradford et al., 2006) consisted of 16 or more participants (see Table 1). The randomized experimental design allowed for more sophisticated data analysis (i.e., Hierarchical Linear Modeling, regression, ANOVA, and MANCOVA) in four of the studies (Allor, Mathes, Roberts, Cheatham, et al., 2010; Allor, Mathes, Roberts, Jones, et al., 2010; Browder et al., 2012; Finnegan, 2012). Data analysis in the two quasi-experimental studies

(Bradford et al., 2006; Conners et al., 2006;) consisted of Conners et al., (2006) conducting a repeated measures ANOVA on pre/post sounding out tests and Bradford et al., (2012) using a data analysis tool embedded within the Edmark reading program to compare pre and posttests scores. Fidelity of implementation is a critical facet of research design that confirms the relationship between outcomes and an intervention (O'Donnell, 2008) and both randomized experiments (Allor, Mathes, Roberts, Cheatham, et al., 2010; Allor, Mathes, Roberts, Jones, et al., 2010) performed exemplary fidelity checks involving multiple observations and rating scales. However, it should be noted that Conners et al., (2006) reported no fidelity of implementation.

2.3.3.2 Single case.

The next grouping of researchers (Flores et al., 2004; Fredrick et al., 2013; Joseph, 2002; Cohen et al., 2008; Waugh et al., 2009) used single-subject designs in an attempt to identify a functional relationship between the intervention and the dependent variable. Cohen et al., (2008), implemented a multiple probe design to examine the effects of simultaneous prompting with three participants. Joseph (2002) implemented a multiple baseline across three participants to simultaneously analyze multiple dependent variables (i.e., word boxes and word sorts) and examined changes across three conditions: baseline, instruction, and maintenance. The multiple baseline design allowed the researchers to observe the effects of the intervention on the first participant while measuring the other participants in pre-intervention phase until a stable baseline was established. Unfortunately, Joseph (2002) did not provide a measure of social validity – a critical component to ensure that dependent variables have high social importance (Horner et al., 2005). The fourth study (Frederick et al., 2013), researchers used a multiple baseline design across sound and word sets to determine the effectiveness of the Phonics Component.

The authors of the final two single subject studies (Flores et al., 2008; Waugh et al., 2009) used an alternating treatment design and changing criterion design, respectively. Waugh et al. (2009) implemented a changing criterion design to measure the effect of simultaneous prompting on oral reading and blending sounds over two school years beginning in the spring semester and continued in the subsequent fall semester. One advantage of using a changing criterion design is the flexibility it provides participants to learn words or sounds because criterion can be adjusted during each phase of instruction.

Flores et al. (2008) implemented a changing criterion design to measure three conditions with three phases embedded within each condition. The three conditions implemented in the study consisted of letter-sound correspondence, blending sounds, and decoding of CVC words.

2.3.4 Intervention Outcomes

All studies included in this review reported varying levels of successful participant reading outcomes. However, the impact of each intervention on the dependent variables varied from study to study.

2.3.4.1 Reading progress.

The first of the two studies (Allor, Mathes, Roberts, Jones, et al., 2010) in which researchers implemented a systematic explicit reading program with a group of students with ID, reported reading gains for the intervention group. Students in the intervention group made statistically significant progress across every standardized measured (e.g. phonemic awareness, oral language and vocabulary, phonemic decoding, word identification, and reading comprehension) compared to the students in the control group. Additionally, the authors reported

the largest effect sizes were for measures of phonemic awareness (blending words, d = 0.53; blending nonwords, d = 0.66; segmenting words, d = 0.66). Effect sizes on four subtests of The Comprehensive Test of Phonological Processing (CTOPP), ranged from 0.57 to 0.88. The authors in the second study containing a systematic explicit reading program (Allor, Mathes, Roberts, Cheatham, et al., 2010) also reported that on average, students in the intervention group made statistically significant progress across every standardized measured (e.g. phonemic awareness, oral language and vocabulary, phonemic decoding, word identification, and reading comprehension) compared to the control group.

The other study consisting of a multicomponent approach to reading instruction, Browder et al. (2012) reported that the treatment group had a higher posttest mean score than the control group for all dependent measures. Effect sizes for the three dependent variables indicated that there were small effects (0.30) for the Peabody Picture Vocabulary and moderate effects for Conventions of Reading (0.49) and Phonics (0.44).

2.3.4.2 Letter sounds & decoding.

Authors of three studies (Cohen et al., 2008; Fredrick et al., 2013; Waugh et al., 2009) in which experimenters implemented a simultaneous prompting intervention reported that all participants met criteria within their respective studies and a functional relationship between the dependent variable (DV) and independent variable (IV) was demonstrated across all participants. However, Waugh et al. (2009) reported the participants were unable to retain the skills they learned over the summer break. Implementing a study around summer break highlighted the importance of continuous instruction throughout the year and also the importance of designing your study properly. A functional relationship between the IV and DV was established in the third single subject design. Joseph (2002) reported that all three participants increased word

reading and spelling performance during treatment phase (i.e., when the combined word study phonics procedures were implemented).

Conners et al. (2012) implemented a systematic explicit instruction intervention and reported higher scores for the intervention group on the sounding out measure compared to the control group, $F(1, 19) = 7.20$, *M.S.E.* = 1809.00. On the measure for predicting sounding out, the instruction group as a whole performed significantly better than the control group on post-instruction sounding out tests even though a high level of variability within the measure was also reported. Despite the success of the intervention, a second measure of nonword and sight word reading resulted in no advantage for the intervention group over the control group.

Investigators in two studies (Bradford et al., 2006; Flores et al., 2004) implementing the *Corrective Reading Program Decoding A* reported student reading success. All six participants in Flores et al. (2004), met criterion across the *m, a, and m/a* conditions but only five of the six participants continued this trend through the next three conditions. One participant was unable to meet criterion for the *t* condition. With the exception of one participant, the other five decreased the number of trials needed to meet criterion for each successive letter. Bradford et al. (2006) reported that all three participants completed level A of *Corrective Reading*. Based on an error analysis, all students performed 97% correct or better on posttests for the following three measures (a) oral letter-sound correspondence, (b) written letter-sound correspondence, (c) word recognition. All three participants reached mastery on two of the four fluency performance mastery tests.

Finnegan (2012) also reported varied reading outcome results for the two interventions implemented in her experimental study. Significant effects, $F(2,48) = 16.353$, $p < .01$, were reported on the measure of training word identification for both treatment groups compared to

the control group but no significant effects were found between the synthetic phonics treatment group and the analogy treatment group. This suggests the synthetic phonics instruction provides no additive effect to increasing the number of words read correctly when compared to analogy phonics. Overall, the treatment group demonstrated that synthetic phonics was more effective compared to the control group in teaching generalized decoding skills to students with ID.

A comparison of studies included in this review to the reviews conducted by Joseph and Seery (2004) and Conners (1992) reveals an increase in phonics based reading intervention studies for students with ID. Authors of the two previous reviews reported the same number of studies meeting criteria (n = 7) creating a stable trend of studies conducted every 10 years. Nonetheless, over the last 10 years there has been an increase in phonics based reading intervention for this population of learners. Ten studies were identified for this current review – an estimated 40% increase.

2.4 DISCUSSION

Researchers of the 11 studies reviewed in this paper reported varying degrees of reading gains as a result of their respective reading interventions. The results of the studies in this review bolster the literature base by providing additional evidence supporting the use of phonics based instruction with students with ID. Interventions varied across studies but one common variable in all of the studies was the use of a systematic and explicit approach to instruction. Similarly to the interventions, a variety of experimental designs were used across the 11 studies but group design was the preferred experimental design method for six of the studies. The use of group design by the majority of researchers represents a new trend in the research base. The last review

conducted by Joseph (2002) reported one experimental group design out of the seven total studies that met criteria.

The purpose of this review was to examine studies over the past 12 years that have implemented phonics based reading interventions to students with ID and to report on the following: (a) with whom and in which types of education settings have these explorations occurred, (b) approaches to phonics instruction that have been empirically explored since the last review, (c) the effectiveness of phonics interventions for students with ID, and (d) evidence of an increased focus on phonics instruction for students with ID since the previous reviews.

2.4.1 Participants

The success of each study warrants acknowledgement but the results should be viewed cautiously. An examination of the selection criteria for participants highlights a bias towards selecting the highest functioning students with ID. The lone exception is the study conducted by Browder et al., 2012. Overall, it should be noted that the participant sample in the majority of the studies are not indicative of all students with ID because of the exclusion of students with <40 IQ scores (Allor, Mathes, Roberts, Jones, et al., 2010). Across nine of the 11 reviewed studies (Browder excluded), all participants had expressive and receptive language skills and all participants possessed some reading abilities. The justification for researchers requiring a minimum reading ability was that researchers were able to focus on the reading skills targeted within the study and not on extraneous beginning reading skills.

In addition to cognitive criterion, some researchers selected participants based on behavioral competencies. Authors of two studies explicitly stated that students with a history of maladaptive behaviors were excluded (Conners et al., 2006; Waugh et al., 2009). Researchers

typically justify excluding students with maladaptive behaviors in academic studies because of the limited amount of time they are afforded to implement interventions. Others will argue that excluding students with maladaptive behaviors is a method of increasing the probability of successful student reading outcomes. Nonetheless, not all researchers excluded participants with behavior issues (Flores et al., 2004) and other authors (Browder et al., 2012) simply did not address behavioral stipulations and chose to include any student with ID. It is understandable that many researchers purposely exclude students with maladaptive behavior from reading intervention studies to maximize the limited amount of time they are given so they can focus on reading interventions and not behavioral interventions. However, students with ID that demonstrate maladaptive behaviors also need effective reading interventions and future research might include reading interventions infused with a behavioral component.

2.4.2 Settings

In recent years, school districts have made a concerted effort to move towards full inclusion for students with disabilities. Initially, students with high incidence disabilities (i.e., specific learning disability, speech language) were the first to be included but recently more students with ID have been part of the inclusion movement. The impetus for including students with ID was for social reasons, but because of recent federal legislation (NCLB, 2001) requiring increased student and teacher accountability, more students with ID are receiving academic instruction alongside their nondisabled peers. Despite this recent trend to include all students with disabilities, the reality is many students with ID still receive academic instruction in self-contained classrooms because of low student teacher ratio and small group instruction is the most effective mode of instruction for students with ID (Gast & Winterling, 1992; Hall, Schuster, Wolery, Gast, & Doyle, 1992; Werts,

Wolery, Holcombe, & Gast, 1995). Arguments for and against the push for full inclusion for students with ID and how academically beneficial full inclusion is for students with ID are still being debated. One solution to ending the argument or at least providing additional information is to examine the literature. Read the current studies and begin analyzing the settings in which the effective reading interventions are taking place.

Settings varied across the studies in this review but not a single study was conducted in an inclusion setting. Interestingly only five of the 11 studies occurred within the participants' self-contained classroom. All other interventions were implemented in a separate empty classroom free of peer distractions. Before implementing reading interventions for students with ID, a careful consideration of setting would be prudent. Before inclusion is decided, consider how and where the effective reading interventions were implemented within the published research. The effectiveness of the intervention may be lessened if implemented in a different setting. In addition to the lack of inclusive settings within the 11 studies was the limited use of teachers implementing reading interventions. Teachers were trained to implement the reading intervention in only four of the 11 studies. In fairness to researchers, federally funded studies may require researchers to strictly adhere to specific guidelines that may limit practitioner's roles in studies. So, it would behoove federal funding sources to reexamine their guidelines and allow more flexibility in the role practitioners play in studies.

2.4.3 Interventions

Reading experts in the educational community have emphasized the importance of phonics-based reading instruction curricula for students that struggle to obtain basic literacy skills (Groff, Lapp, & Flood, 1998; Stahl, Duffy-Hester, & Stahl, 1998). However, reading instruction for

students with ID has been typically one-dimensional consisting of the sight word approach to reading (Katims, 2000). With the passage of No Child Left Behind (NCLB), teachers are now required to use evidence-based practices while teaching standards based curriculum. As a result of these new mandates, researchers are examining the effects of evidence-based reading interventions (i.e., direct instruction) on students with ID. As evidenced by this review of the literature, researchers implemented a variety of interventions but the one constant in each intervention was use of systematic explicit instruction.

Interventions implemented across the 11 studies varied greatly. Experimenters in three studies used simultaneous prompting (Cohen et al., 2008; Fredrick et al., 2013; Waugh et al., 2009) and other authors (Bradford et al., 2006; Flores et al., 2004) used established reading curricula as an intervention (i.e., *Corrective Reading*). One element of each intervention that was consistent across studies was the delivery model. Interventions were either implemented one-to-one or in a small group. One possible explanation of why researchers in all studies used a similar delivery model is that several experts in the field believe small group instruction is the most effective mode of instruction for students with ID (Gast & Winterling, 1992; Hall, Schuster, Wolery, Gast, & Doyle, 1992; Werts, Wolery, Holcombe, & Gast, 1995). So, if more students with ID are to be fully included in general education settings, researchers should consider implementing future studies that have interventions being delivered to students with ID in small groups within the inclusion setting.

In addition to delivery model, consistency in the number of minutes each intervention was implemented (M=32.5) was evident in five of the 11 studies (Allor, Mathes, Roberts, Cheatham, & Champlin, 2010; Allor, Mathes, Roberts, Jones, & Champlin, 2010; Bradford, Shippen, Alberto, Houchins, & Flores, 2006; Finnegan, 2012; Joseph, 2002). The mean of 32.5

minutes of reading instruction can serve as a starting point for practitioners as they prepare future reading lesson for their students. Unfortunately, authors of the other five studies (Browder, Ahlgrim-Delzell, Flowers, & Baker, 2012; Conners, Rosenquist, Sligh, Atwell, & Kiser, 2006; Flores, Shippen, Alberto, & Crowe, 2004; Cohen, Heller, Alberto, & Fredrick, 2008; Waugh, Fredrick, & Alberto, 2009) were inconsistent with reporting the duration of reading interventions. Investigators in one study (Browder et al., 2012) did not indicate the amount of time reading interventions were implemented daily and other authors did not predetermine a fixed amount of reading intervention time for each participant possibly due to the experimental design (i.e., changing criterion design) being implemented (Fredrick et al., 2013; Waugh et al., 2009).

2.4.4 Experimental Design

The design of an experiment is critical to obtaining accurate data from a study and the researcher must collect and record data accurately and with fidelity. If the data are inaccurate or do not properly measure the effect of the IV on the DV, the conclusions made from the data will be deceptive and the experiment cannot be replicated in future studies.

This review of the literature has highlighted a subtle change in the preferred experimental design used in research involving students with ID. Prior to 2001, single case design was the preferred experimental design for research involving students with ID. There are advantages to implementing single case designs such as the level of rigorous methodology that documents experimental control. An additional benefit of single case design is the selection of dependent variables that have high social importance (Horner, et al., 2005). The social significance of being able to read, single case design's rigorous methodology, and its ability to establish a functional

relationship between the DV and IV, makes single case design an appealing choice for researchers when conducting reading instruction research for students with ID.

Despite the advantages to using single case design some limitations should be noted. According to recently published quality indicators (Horner et al., 2005), an intervention needs to demonstrate efficacy in multiple studies conducted by different teams of researchers in order for the practice to be deemed evidence-based. And, single case design typically consists of 3-4 participants so generalizing the findings to the rest of the ID population is difficult. Having said that, in the current review, all but one of the single-subject studies, Joseph (2002), met every quality indicator (Horner et al., 2005).

Regardless of the experimental design selected by researchers, it is evident that more high quality research on effective reading interventions for students with ID would benefit not only practitioners but also more importantly students with ID. With carefully implemented well-designed studies, outcomes are less susceptible to skepticism and the interventions are more likely to be replicated.

2.4.5 Outcomes

The researchers in this review went beyond the typical sight word approach to reading instruction that has been so widely used for years (Browder et al., 2009) and implemented phonics based reading interventions. Authors reported successful phonics based reading outcomes through the use of systematic instruction for students with ID. These successful results should provide encouragement for researchers to further examine the effects of letter-sound correspondence, decoding and word reading instruction with students with ID. The researchers deserve praise for their successful interventions but questions remain regarding the relevance and

significance of the successful interventions when applied within the general school context. A quarter of the studies neglected to explicitly state the location of where the intervention occurred and knowing where the intervention occurs is paramount to future researchers intending to replicate studies and also for practitioners searching for effective reading intervention to use in his or her classrooms.

Authors of the study with the second largest sample of participants (Allor, Mathes, Roberts, Cheatham, et al., 2010) reported that students receiving phonics based reading interventions made educationally meaningful, statistically significant progress on standardized measures of reading and language. Unfortunately, it took 2-3 years of intensive small group instruction to achieve. From a policy standpoint, this may not be a viable intervention for school districts. And for future researchers, things to consider before replicating a study of this magnitude are the inevitable movement of a portion of students and staff during that three-year period due to families moving, retirement, and availability of staff resources. Another important finding was the high variability across students. This is an indication that group averages concealed low performing students or students that made little to no gains throughout the three years of the study. The concern being that even though large groups of students with ID can benefit from high-quality, intensive reading interventions, a select numbers of these same students will be unresponsive to the intervention and will need additional interventions.

Results of reading gains for older participants in the studies should encourage teachers, parents and other stakeholders to continue reading instruction to individuals with ID regardless of age. However, many of the studies focused on beginning reading skills for adolescent aged participants. This may be an indication that reading instruction is either not being sufficiently

implemented to students with ID during the primary grades or different reading interventions are needed.

2.4.6 Implications for Practice

Schools are chaotic environments filled with individuals that are in a constant state of flux and with educational funding shrinking every year, schools are expected to do more with less. Therefore, variables to consider before schools implement any of the interventions reviewed in this paper are the costs associated with implementation and identifying personnel responsible for effective implementation. Large-scale interventions require substantial resources including but not limited to trainings, ongoing fidelity monitoring, and additional support personnel. Conversely, single subject design interventions require less participants and time, but to implement a single case intervention, a required level of knowledge/training on single case is needed. Both experimental designs are recognized as legitimate research methods but school districts should first look carefully at each design and decide which one will best meet their needs.

A final implication is the lack of practitioners implementing interventions within current studies. Only four (Browder et al., 2006; Flores et al., 2008; Fredrick et al., 2013; Waugh et al., 2009) of the 11 studies had interventions being implemented by classroom teachers. This is concerning because the classroom teacher intuitively has a greater familiarity of the students' ability academically and behaviorally than the researcher. This knowledge could be beneficial to reducing performance anxiety or maladaptive behaviors manifested from working with unknown adults (i.e., researchers). As stated previously, constraints put on researchers by federal funding sources may be an obstacle to more practitioner involvement in studies but ultimately, it will be

the classroom teacher's responsibility to deliver effective reading instruction. If guidelines are not lessened to allow more collaboration between researchers and practitioners on effective reading instruction – the gap between practice and research will continue to widen.

2.4.7 Conclusion

Reading interventions for students with ID not only need to be effective but also practical. Limited time during the school day and an increase in teaching responsibilities require interventions for teachers that are simple, efficient, and can be implemented in the classroom versus interventions requiring isolation. If full inclusion for students with ID is going to be realized future research should include studies that are conducted in the inclusion setting.

With the passage of No Child Left Behind (NCLB), the focus on functional skills for students with ID has shifted to a more academic/standards based curriculum (Wehmeyer et al., 2006). Extant research supports the claim that students with ID can learn reading skills (Browder et al., 2004) so it makes little sense that reading instruction for this population of students continues to be underemphasized (Ahlgrim-Delzell, Algozzine, Browder, Spooner, & Wakeman, 2006). Over the last 12 years, 11 empirical studies on phonics based reading interventions for students with ID have been published. Obviously, improvement of effective reading instruction for this population hinges on more research and that means researchers should continue to conduct more studies that examine the effects of interventions that have been shown to be effective for students with milder disabilities (i.e. LD) on students with ID.

2.5 RESEARCH QUESTIONS

The purpose of my study was to examine the effect of teachers' use of reading curriculum based measurement (CBM) combined with student consultation and goal setting on related student reading outcomes and amount of provided daily reading instruction. Three teachers administered weekly CBM to four eligible students with ID and monitored data for 16 consecutive weeks. Participating teachers consulted with each participating student weekly to share previous CBM scores, provide encouragement and to highlight weekly reading goals. A multiple baseline across participants design (Horner and Baer, 1978) was used to display and interpret visual data. In addition to being trained to administer CBM, teachers also learned to interpret CBM data to assist them in making appropriate instructional changes for participating students. Specific questions included:

1. Does teacher use of reading curriculum based measurement (CBM), student consultation, and goal setting lead to increases in CBM performance of students with ID?
2. Does teacher use of reading curriculum based measurement (CBM), student consultation, and goal setting lead to increases in the amount of reading instruction provided to students with ID?

3.0 METHODS

3.1 PARTICIPANTS

The study consisted of four students with the primary disability label of ID who participated in the Pennsylvania Alternate System of Assessment (PASA) reading test (i.e. Levels B or C) during the 2013 - 2014 school year. Students participating on the B and C level PASA test represent the higher performing sub-group of students with significant cognitive disabilities (SCD) who's reading assessments include text. All students were in grades 3 through 6 during the 2013-2014 school year.

All students spoke English as their first language and were able to verbally communicate without the assistance of technology or interpreter. Students with a primary disability label of ID and a secondary label of visually impaired were eligible if they could read enlarged print and did not rely solely on braille. The final criterion for student eligibility was that all participants must have the ability to remain seated and focused for the duration of the screening process and have at least one literacy goal on his or her IEP. A description of each participant follows. Pseudonyms are used in accordance with institutional review board (IRB) requirements to protect confidentiality.

3.1.1 Jack

Jack is a Caucasian male who was in 3rd grade (i.e., 8 years old) during the study. Jack received all instruction within a self-contained, special education classroom. The classroom personnel consisted of one certified special education teacher and three paraprofessionals who provided services for eight students with a range of disabilities. Jack met state requirements for ID with a full scale IQ of 47 (Kaufman Brief Intelligence Test (KBIT-2)) and received speech/language services, occupational therapy, and physical therapy services throughout the school year. Jack had a history of behavioral issues consisting primarily of the inability to stay focused and on task for extended periods of time. Jack's individual education plan (IEP) reading goals addressed phonological awareness skills. More specifically, demonstrate phonological awareness through the segmenting and blending of phonemes and use knowledge of letter sound correspondence to decode words in context.

3.1.2 Carry

Carry is a Caucasian female who was in 6th grade (i.e., 12 years old) during the study. Carry received instruction, with the exception of an elective class, in a self-contained, special education classroom located in a separate school within her county of residence. The school provided students with intensive special education services that were unavailable at their home-zoned school. Carry's classroom personnel consisted of one certified special education teacher and three paraprofessionals who provided special education services to eight other students with disabilities. Carry's Full Scale IQ of 66 on the Wechsler Intelligence Scale for Children, fourth edition (WISC-IV), met the state's requirement for ID. In addition to academic instruction, Carry

received additional weekly services that included speech/language to help receptive and expressive language skills and occupational therapy for improving fine motor skills (e.g. typing and cutting). Her IEP reading goals addressed oral reading fluency, reading and listening comprehension, and phonics.

3.1.3 Kevin

Kevin is an African American male who was in the 3rd grade (i.e., 9 years old) during the study. Kevin received special education services within a self-contained, special education classroom. The classroom personnel consisted of one certified special education teacher and four paraprofessionals providing instruction to 12 students with varying disabilities and grade levels. Kevin had a history of seizures and family issues that contributed to a high rate of absenteeism. Kevin's Full Scale IQ 61 on the Wechsler Intelligence Scale for Children, fourth edition (WISC-IV) met the state's requirement for ID. Kevin received weekly speech/language services due to deficits with receptive and expressive language and weekly occupational therapy to improve his fine motor skills. His IEP reading goals addressed comprehension and learning 40 or more survival/sight words.

3.1.4 Rae

Rae is a Caucasian female who was in the 4th grade (i.e., 10 years old) during the study. Rae received special education services within a self-contained, special education classroom. Rae's classroom staff was comprised of one certified special education teacher and three paraprofessionals who provided instruction to five students with disabilities. Rae received a

variety of supplemental services including: speech/language, behavioral support, occupational therapy, and physical therapy. Rae had a history of self-injurious behavior and occasionally demonstrated physical aggression towards staff. Rae's Full Scale IQ of 44 on the Comprehensive Test of Nonverbal Intelligence, Second Edition (CTONI-2), met the state's criteria for the ID designation. Rae's IEP reading goals addressed sight word instruction and mastery of picture vocabulary. Her teacher reported that Rae was able to verbally identify all letters of the alphabet and verbally identify over 50 pictures of everyday items.

3.2 SETTING

The intervention occurred within the same environment where students received daily reading instruction. Thus, weekly CBM was administered in the students' natural school setting (i.e. self contained classroom). For the purpose of this study, a self- contained special education classroom was defined as an educational environment where only students with disabilities receive special education services for more than 80% of the school day. Only special education teachers delivering reading instruction to students with ID within self-contained classrooms were considered for the study. However, students who were fully included for all other subjects except reading were eligible for the study. Lastly, all reading screening assessments were administered in settings that provided privacy from distractions. Settings included separate classrooms and vacant conference rooms within the schools.

3.3 MATERIALS

Teachers were provided appropriate CBM test booklets and scoring sheets (see p.45 for detailed explanation of student placement). The passage reading fluency (PRF) and letter sound fluency (LSF) measures originated from easyCBM (Alonzo & Tindal, 2010). The Language Arts Instructional Log (LAIG) was printed by the PI and distributed to teachers weekly as well as the descriptors of each reading skill. Lastly, each teacher received a Samsung Galaxy 2 tablet to record and send all CBM sessions electronically to the PI.

3.4 DEPENDENT VARIABLE

Two dependent variables (DV) were measured throughout the duration of this study. The first DV was a curriculum-based measure of one of the following CBM: (a) letter sound fluency, or (b) passage reading fluency. The type of CBM was determined during the screening process (see Procedures (p. 44) for detailed explanation) and administered weekly by the teacher during both baseline and intervention phases to their respective student to monitor reading progress. In addition to CBM scores, the number of words read incorrectly were also monitored and displayed visual through a graph. During baseline, three consecutive CBM data points were used to create an estimated end of the year reading goal for each student. An end of the year goal for each student was based on the 50th percentile end of the year performance of students in the norm sample (Alonzo & Tindal, 2010). An aimline slope was established by connecting the median score of the three baseline scores with the end of year goal (Lemons et al., 2012). For example, a student who had a baseline score of 9 on kindergarten LSF CBM would have been

assigned an end of the year reading goal of 35 letter sounds and an aimline would have been plotted on a graph between 9 at the start of intervention and 35 at the end of the 16 weeks.

The second DV was the duration (i.e., minutes) of reading instruction provided by each teacher each day. Prior to intervention, teachers documented daily reading instruction using the modified reading log (see Appendix J) every day each week for three consecutive weeks (i.e., during baseline). The median of each week's daily totals represented one data point.

Basic Phonics Skills Test III (BPST-III; Shefelbine, 2006) was also administered as a descriptor measure. The BPST-III is an informal measure used to assess students' knowledge of common consonant sounds, the short sound for each vowel, and words representing 12 different phonetic patterns. The BPST-III was administered twice - once prior to baseline and once at the conclusion of the study (post intervention). Pre-baseline scores were compared to post intervention scores to examine individual student reading growth.

3.5 INDEPENDENT VARIABLE

The independent variable (IV) was teachers' use of CBM, student consultation, and goal setting. Teacher's use of CBM consisted of weekly administrations of either LSF CBM or PRF CBM (depending on the student placement). The goal-setting portion of the IV consisted of a reading goal for each student determined by the 50th percentile of the corresponding grade level CBM. Student consultation consisted of the teacher sharing previous week's CBM scores with the student prior to CBM administration. During the data sharing session, the teacher informed and also highlighted the word or letter sound the student needed to reach in order to meet or exceed

his or her previous weeks CBM score. Procedures and a more detailed explanation of the independent variable are described under section 3.7.2 on p. 49.

3.6 EXPERIMENTAL DESIGN

To determine if teacher use of reading CBM, student consultation, and goal setting lead to increases in CBM performance and the amount of reading instruction for students with ID was evaluated using a multiple baseline across participants single subject design (Horner & Baer, 1978). The multiple baseline design requires continuous measurement of all participants prior to the introduction of the independent variable. First, baseline data is collected simultaneously across the four participants. Once stability is achieved in one participant, the intervention is introduced while maintaining baseline conditions for the other three participants. The remaining participants are introduced to intervention after the predetermined criterion level for staggering the introduction of the intervention has been met. One advantage of a multiple baseline design is that the intervention (an academic intervention) does not need to be withdrawn if the student responds.

Visual analysis of the data was used to interpret the level, trend, and variability of reading performance occurring during baseline and intervention conditions. The goal of the analysis was to determine whether there was a functional relation between the IV (i.e., teacher use of reading CBM, student consultation, and goal setting) and the DV (i.e., CBM performance and the amount of reading instruction).

3.7 PROCEDURES

A recruitment letter (see Appendix A for letter) was mailed electronically to teachers located within 20 miles of the University of Pittsburgh Oakland campus who taught eligible students. After IRB approval was obtained (see Appendix B), PASA staff was provided an electronic recruitment letter written by the PI that was distributed to potential eligible teachers. PASA staff used their teacher and student database to identify potential special education teachers that administered the PASA to students with ID and who worked in surrounding school districts. Potential teachers had to meet the following criteria:

1. Must have been the IEP holder of the student.
2. Must have taught 3rd, 4th, 5th, or 6th grade.
3. Must be able to provide intensive reading interventions to the student (i.e., one-on-one or small group consisting of 2-4 students; teachers who provide reading instruction within the general education classroom were excluded).
4. Not currently using CBM to monitor weekly reading progress.

Upon receipt of the recruitment letter, teachers were prompted to contact me via phone or email with questions regarding participation in the study. If the teacher agreed to participate, they were provided a principal permission letter (see Appendix C) to be completed by their principal. If the teacher declined or did not respond, no additional contact was made. If the teacher accepted, I followed the teacher's school district procedures for securing approval to conduct research within its schools. Teachers completed and filled out participant consent forms (see Appendix D) for themselves and distributed parent consent forms and student assent forms (see Appendix E) to appropriate individuals. Once all consent forms were completed and returned, I conducted reading-screening assessments to determine student eligibility for the study.

Prior to implementation of the study, I assessed each student to determine eligibility for the study by administering CBM. All students were first administered the 2nd grade PRF (see Appendix F). If the student scored at or above the end of the year 50th percentile benchmark (100 words per minute), the next higher grade-level measure (e.g., 3rd grade PRF) was administered. This procedure repeated until the student either did not achieve benchmark or was reading words from the highest level of the measures (i.e., 5th grade PRF). If the student was unable to read a minimum of 58 words (fall 50th percentile norm) a minute on the 2nd grade PRF, the first grade word reading fluency (WRF) (see Appendix G) CBM was administered. And the PRF procedures for determining grade level placement were applied to WRF. If the student could not read 10 words (fall 50th percentile norm) in one minute on the first grade WRF CBM, the kindergarten letter sound fluency (LSF) (see Appendix H) assessment was administered until an appropriate level was reached. However, the student was ineligible if they could not score at or above the fall 50th percentile norm (i.e., four letter sounds) in one minute. The rationale for including students that had varying degrees of reading ability was to match the appropriate type of CBM (i.e., PRF or LSF) to the student's current instructional level. Once screening was completed and four eligible students were identified, teacher training commenced.

Prior to baseline, teachers were provided training on the following: a) CBM administration; and b) reading skills listed on the daily instructional log. CBM training consisted of scheduling a time to meet with each teacher after school. Before the face-to-face meeting, teachers were provided a power point detailing the CBM administration procedures as well as video models. During the training session, CBM administration procedures were explained and demonstrated to each teacher. CBM training concluded when each teacher demonstrated mastery of CBM administration. Mastery consisted of each teacher administering CBM to the PI with

100% accuracy. The PI measured mastery using the fidelity of implementation four-point checklist (See Appendix I). If the teacher scored below 100%, retraining occurred before the teacher was retested on CBM administration.

After the CBM training, teachers received a printed description of all reading skills listed on the daily reading log and time keeping procedures and directions on filling out the log were provided. Prior to intervention, each teacher was trained on a) student consultation; and b) goal setting and instructional changes: teachers were provided with the script to be read during her consultation with the student. Next, teachers were trained on the four-point rule to determine when an instructional change or creating new benchmark needed to occur.

3.7.1 Baseline

Each teacher administered the appropriate CBM to her respective student once a week for three consecutive weeks (teachers did not score). CBM sessions lasted approximately one minute with the teacher adhering to all time keeping and administration procedures including: (a) starting and stopping the timer (b) recording words read incorrectly or skipped words by making a slash through the word. Every week, teachers sent me the recorded CBM session electronically to be double scored and monitored for fidelity of implementation.

After three consecutive weeks, the student with the most stable baseline performance entered intervention. Prior to intervention, the PI established an end of the year reading goal for the student. An aimline was also established by creating a slope using the appropriate grade level 50^{th} percentile end of the year benchmark and the median baseline score (Lemons et al., 2012). Thereafter, the next participant entered intervention after the previous participant had three consecutive weeks of CBM scores. This procedure was used to enter remaining students into the

intervention phase. After the first three weeks, data collection on CBM continued every week for students remaining in baseline.

To establish baseline for the amount of time teachers spend on daily reading instruction, teachers completed and submitted a daily Language Arts Instruction Log (LAIL) (see Appendix J) adapted from the *Language Arts Log (LAG)* (Rowan & Correnti, 2013) every school day for three consecutive weeks. The teacher reported the amount of minutes dedicated to individual reading skills per LAIL and reported the cumulative amount of minutes for daily reading instruction. The median of each week's reported times represented one data point for the entire week. Once the first teacher began the intervention phase, the median time for each week of reported reading times continued to be graphed. During the intervention phase, the remaining teachers continued in baseline and documented total minutes of daily reading instruction using the LAIL every day. The median time for each week was graphed every week. In addition to the total amount of weekly reading instruction minutes, the amount of daily phonics instruction will be parsed out of each week's total and graphed.

3.7.2 Treatment Phase

Prior to intervention, the PI analyzed baseline data and established an end-of-year CBM goal and an aimline for each child. Once the end of the year benchmark had been established, the data was shared with the teacher. During treatment, teachers continued to administer CBM but did not score or graph weekly data. The graphed data assisted teachers in determining when an instructional change or new reading goal should occur. Each week, the PI provided the teacher graphed CBM data with aimline from the previous weeks. Prior to administering the CBM, the teacher asked the student to join her at a table and began recording. Once recording had begun,

the teacher read a script (see Appendix K) informing the student of their previous score along with verbal and physical (i.e. fist bump or high five) praise. The script also prompted the teacher to highlight the word or letter sound on the student CBM sheet that identified where the student needed to read in order to beat his or her previous score. Next, the teacher immediately began reading the CBM instructions and proceeded to administering the measure.

After four consecutive data points below the aimline, the teacher was required to make an instructional change (e.g., extend instructional time, one-to-one instruction, etc.). The *Four-Point Rule* (Stecker & Lembke, 2007) was used to determine when teachers should make instructional changes. Teachers adhered to the following steps: (a) after four weeks of instruction have occurred during treatment, examine the four data points. (b) If all four points fall above the goal line, the teacher will notify the PI and together a new reading goal for the student (i.e., increase the goal) will be established. The new reading goal will be the score at the next higher quarter percentile (i.e., 75th percentile) for the end of the year grade level benchmark in the easyCBM norm group (easyCBM, 2010) for each student's particular measure. (c) If four consecutive points are below the goal line, the teacher will make an instructional change and inform the PI of the change. (d) If the four data points fall both above and below the goal line, the teacher will keep collecting data until the four-point rule can be applied.

3.8 INTER-OBSERVER AGREEMENT, FIDELITY OF IMPLEMENTATION, AND SOCIAL VALIDITY

Teachers recorded all baseline and intervention CBM sessions. A trained reviewer along with the PI doubled scored each video to obtain interobserver agreement (IOA). All recorded CBM

sessions were also scored for fidelity of implementation. Both reviewers used a fidelity checklist to make sure each teacher: a) used the correct test booklet and student form, b) adhered to timekeeping procedures, c) read instructions (and script during intervention) accurately, d) marked incorrect and skipped words accurately (see Appendix I for copy of fidelity checklist). Fidelity checks continued for every CBM session during the study.

Regarding teacher reporting of the amount of daily reading instruction, the PI conducted one fidelity observation weekly to document the duration of the reading lesson. During observations, the LAIL was used to document the amount of time for each reading skill observed and compared times with times reported by the teachers. IOA was obtained for every observation.

The PI and a trained colleague obtained interobserver agreement (IOA) for CBM scoring accuracy, as well as treatment fidelity by viewing 95% (n=61) of teacher recorded and submitted CBM session videos. IOA for CBM scoring was 90%. Of the six assessments with a scoring discrepancy, only 1 was discrepant more than 1 point. IOA for CBM accuracy scoring and fidelity of implementation scoring was calculated by dividing the number of agreements by the number of agreements + disagreements multiplied by 100 (Gast, 2010). Procedural fidelity was measured each week by viewing submitted CBM video recorded sessions. The PI and one additional trained colleague watched each session comparing procedures to the four-point fidelity of implementation checklist. Fidelity of implementation by teachers was 98% with an IOA of 100%. The total number of teacher behaviors observed during the sessions was divided by the total number of teacher behaviors on the four-point fidelity of implementation checklist and multiplied by 100.

To measure social validity, each teacher was sent a link via email that allowed her to access a survey (see Appendix L). The survey provided teachers an opportunity to share their opinions about the goals, procedures and effects of the study (Gast, 2010). The survey consisted of eight questions with seven questions using a Likert scale questionnaire and one question using a multiple-choice answer. A second link was emailed to each teacher that provided access to the student survey (see Appendix M). Questions on the survey inquired about student's perceptions on weekly CBM sessions and their reading abilities.

4.0 RESULTS

The primary purpose of this study was to extend the research focusing on the use of CBM with students with ID by determining if teacher use of reading CBM, student consultation, and goal setting would lead to increases in CBM performance of four students with ID. To answer the research questions, three teachers were trained to administer CBM and to complete weekly reading instruction logs. Next, prior to entering the intervention phase, each teacher was trained on goal setting and student consultation. After 16 weeks, visual analysis of CBM data occurred to determine if weekly CBM, student consultation, and goal setting was associated with an increase in student CBM reading scores or a change in the amount of weekly reading instruction each student received. Results are presented for research questions, the BPST-III, and social validity surveys.

4.1 DOES TEACHER USE OF READING CURRICULUM BASED MEASUREMENT (CBM), STUDENT CONSULTATION, AND GOAL SETTING LEAD TO INCREASES IN CBM PERFORMANCE OF STUDENTS WITH ID?

Figure 1 contains the graphs for CBM scores per week for Jack, Kevin, Carry and Rae. Consecutive weekly CBM sessions occur along the x axis and the y axis indicates words or letter sounds read correctly per minute. Filled dots connected with the thicker black data path indicate

words or letter sounds read correctly per minute. Open dots connected with the thinner black data path indicate words or letter sounds read incorrectly. The first phase change line denotes a transition from baseline to the implementation of the intervention. All dashed phase lines represent an instructional change or reading goal change.

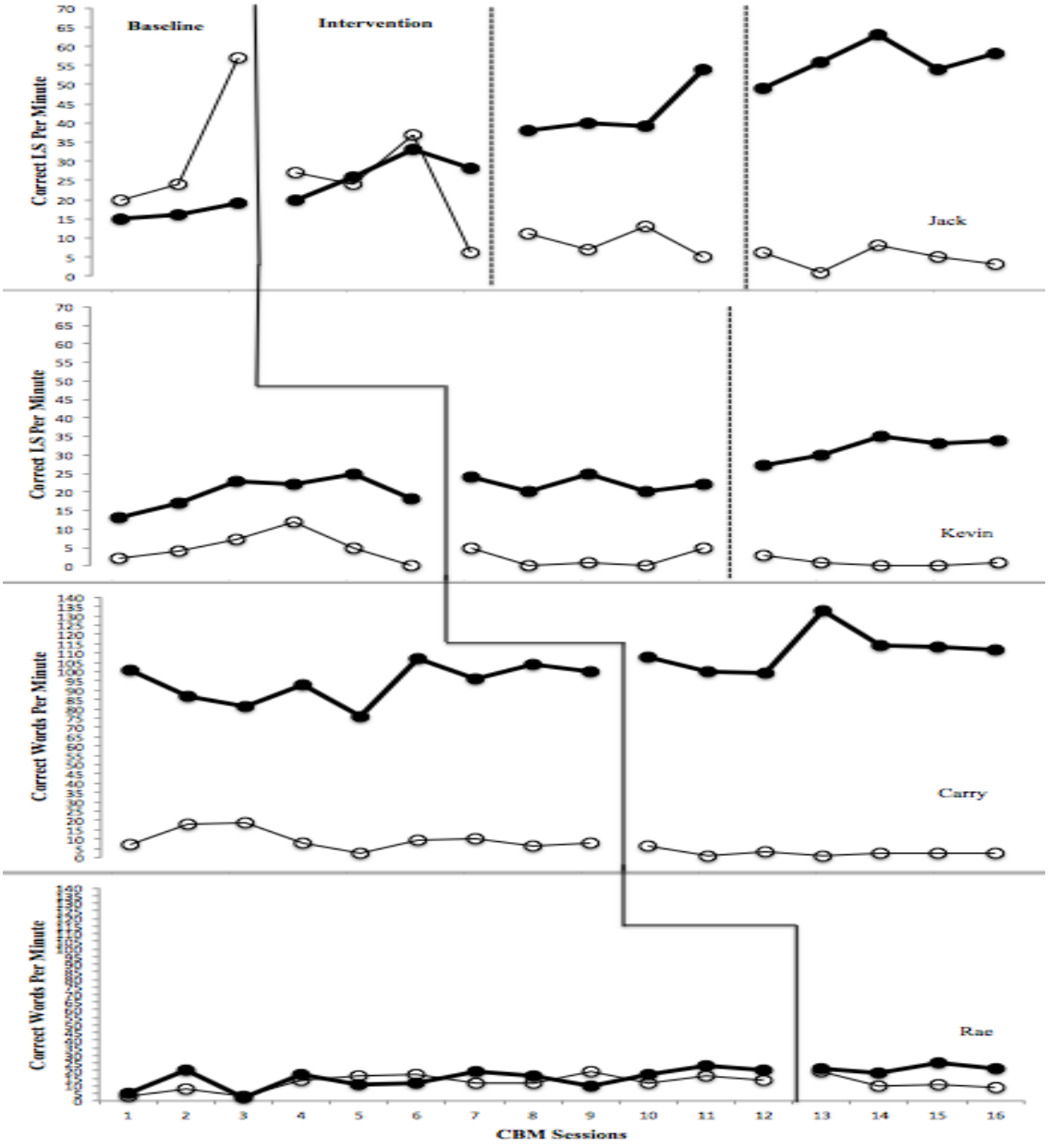

Figure 1: CBM Multiple Baseline

4.1.1 CBM scores during baseline

The graphs in Figure 1 illustrate that during baseline, three of the students' (Kevin, Carry, and Rae) demonstrated high variability in CBM performance, with Kevin's data having an upward trend with an average of 18 (r. 13-23) letter sounds read correctly per minute, Carry's data trended downward with an average of 90 (r. 101-81) words read correctly, and Rae's data demonstrating instability causing an up and down trend with an average of 9 (r. 2-20). Jack's data had the least variability and a slight upward trend with an average of 17 (r. 15-19).

4.1.2 Jack

Jack was the first participant to enter intervention. Visual analyses of Jack's data revealed a pattern of increase in correct letter sound reading across three goal changes. During the screening process, the letter sound fluency measure was deemed most appropriate for Jack's weekly CBM due to his inability to read whole words or connected text. Prior to the first intervention CBM session, Jack's end of the year reading goal was established at 35 letter sounds (Kindergarten 50th percentile) in one minute. An aimline (see Figure 2) was constructed using his baseline median score of 16 LS and his end of the study reading goal of 35 LS.

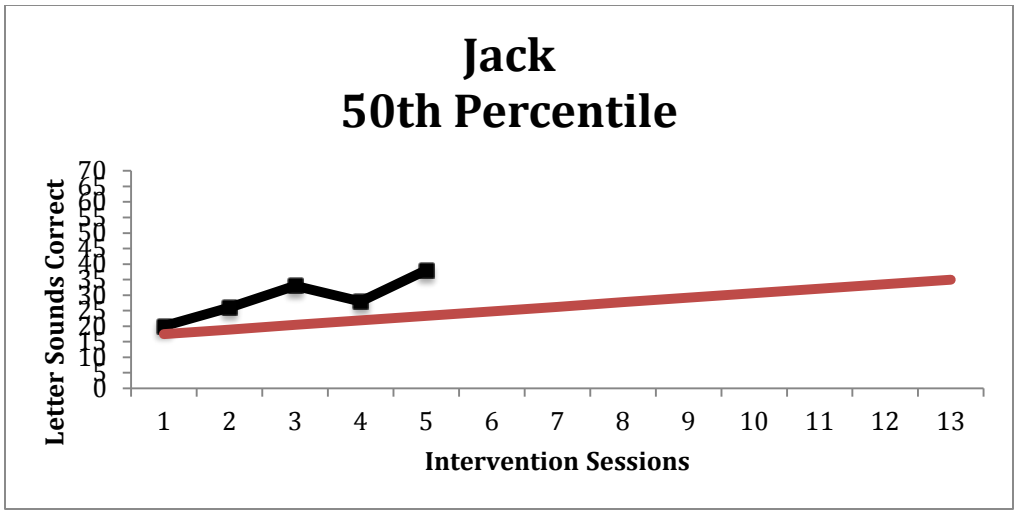

Figure 2: Jack's First Aimline

No absolute level change occurred upon initial exposure to intervention (Jack read one additional letter sound). However, Jack had a relative level change improvement of 17 letter sounds. Jack's letter sounds read correctly continued on an upward trend during weeks four to six. During week seven, his data trend decelerated but his score remained above the aimline with and average of 27 (r. 20-33) letter sounds correct. Per *the 4-point rule*, a new reading goal (see Figure 3) was increased to 42 LS (75th percentile) a minute. An absolute level change occurred with an improvement in reading letter sounds (increase of 10).

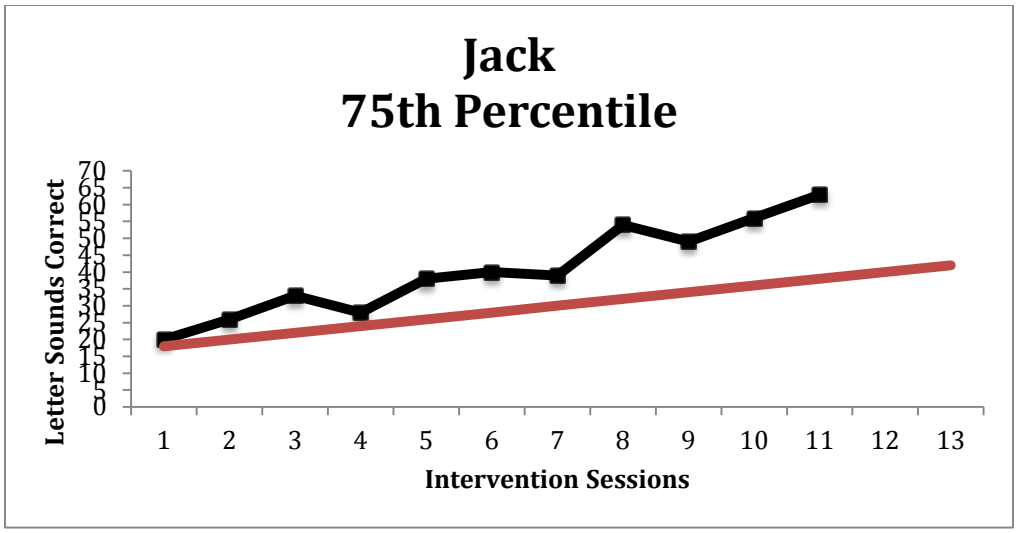

Figure 3: Jack's Second Aimline

His data trend stabilized between weeks 8 and 10 before an upward trend during week 11 with an average of 43 (r. 38-54) letter sounds read correctly. Per *the 4-point rule*, another reading goal was established. Jack's new reading goal (see Figure 4) was set at 51 LS (90th percentile) a minute. A deteriorating absolute level change occurred after the introduction of the new reading goal. Jack's data trend declined slightly (5 LS) on week 12 but reversed to an upward trend on week 13 and 14. The last two weeks his trend declined slightly before moving upward during the final week of the study with an average of 56 (r. 49-63). During the 16 weeks, Jack's highest score during intervention was 63 LS a minute (week 14) and his lowest score was 20 LS a minute (week 4).

In addition to fluency, words read incorrectly were also graphed for each participant. Figure 1 illustrates the number of letter sounds Jack incorrectly read during each CBM session. During baseline, Jack actually read more words incorrectly than correctly. Jack's data had a slight upward trend for the first two weeks but on week three the trend increased dramatically with an average of 34 (r. 20-57) letter sounds read incorrectly. An absolute level change occurred

during week four with Jack making 30 less mistakes on his letter sound reading. There was overlapping data during week five and six before a drastic downward trend on week seven with an average of 24 (r. 6-37) letter sounds read incorrectly. The data stabilized during weeks 8 through 10 before a downward trend during week 11 with an average of 9 (r. 5-13) letters sounds read incorrectly. The data stabilized across week 12 and declined during week 13. Week 15 began a downward trend that continued through week 16. Over the last five weeks of the study, Jack had an average of 5 (r. 1-8) letter sounds read incorrectly.

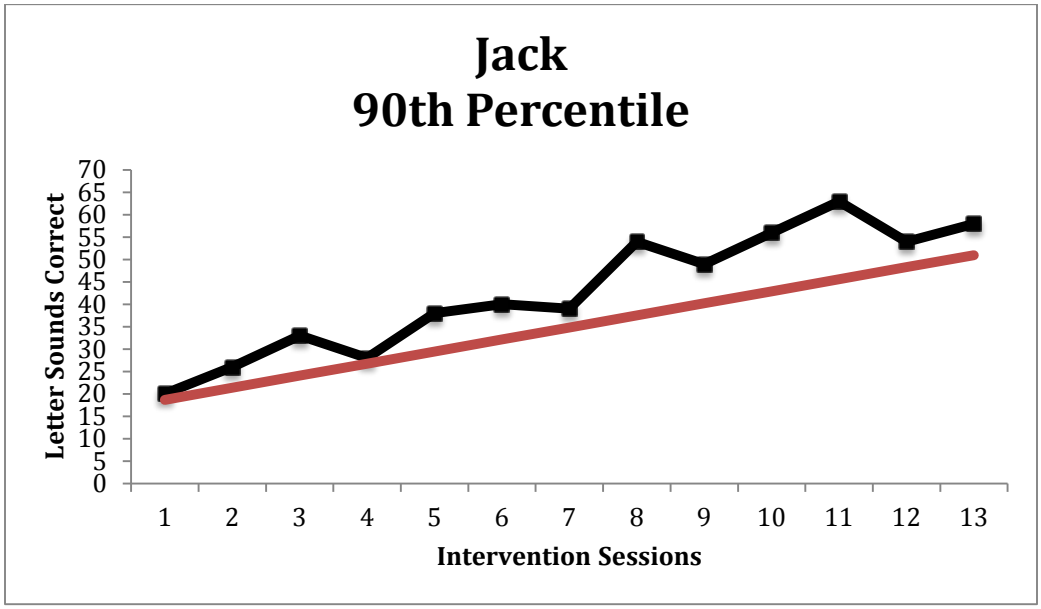

Figure 4: Jack's Third Aimline

4.1.3 Kevin

Kevin was the second participant to begin intervention (week 7). Visual analyses of Kevin's data revealed a pattern of increased correct letter sound reading across one instructional change. The letter sound fluency measure was the most appropriate CBM for Kevin's due to his inability to read whole words during the screening process. His reading goal was 35 LS (Kindergarten 50th

percentile) a minute and Kevin's aimline (see Figure 5) was created using his median baseline score of 20 and extended to his end of the year reading goal of 35 LS. An absolute level change did not occurred upon initial exposure to intervention (Kevin read 25 LS during week five and read 24 LS on week seven (the first intervention data point)). However, there was a relative level change improvement of 2 letter sounds. Kevin had variability in his first five reading scores during treatment with three of the five scores falling below the aimline. A decision was made after week 11 for an instructional change. The instructional change consisted of seven minutes of phonemic awareness instruction for Kevin in a small group setting consisting of three students and one teacher. Kevin's score for week 12 increased by five LS and on week 14 he achieved his reading goal 35 LS a minute. However, his scores decreased in weeks 15 and 16, 33 and 34 LS respectively.

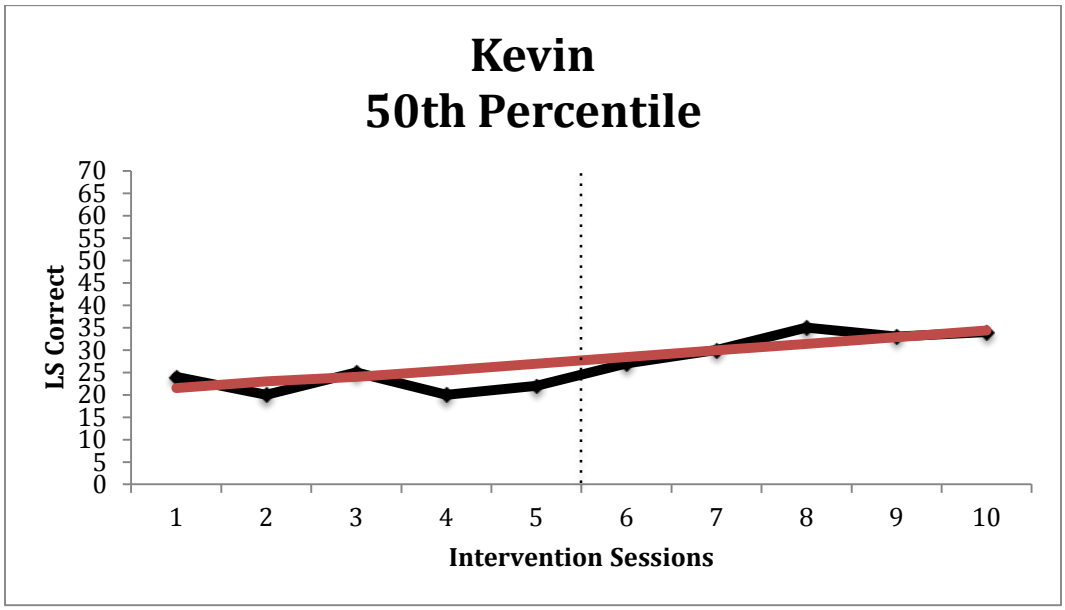

Figure 5: Kevin's Aimline

During the first four weeks of baseline, Kevin's number of words read incorrectly had an upward trend – similar to his words read correctly (see Figure 2). Week five began a downward trend with an overall baseline average of 5 (r. 0-12) LS read incorrectly. During treatment, Kevin's data remained stable with an average of 2 (r. 0-5) LS read incorrectly. After the instructional change during week 11, data remained stable with a slight decrease in LS read incorrectly (m = 1, r. 0-3).

4.1.4 Carry

Carry was third participant to start treatment starting on the 10th week of the study. During the screening process, Carry scored 114 on the 3rd grade PRF (116 was the 50th percentile) so the decision was made to place Carry on the 4th grade PRF with an end of the year reading goal of 138 words a minute. The variability within her baseline scores produced a baseline median score of 98. Her aimline extended from 98 to her end of the year reading goal of 138 words (see Figure 6).

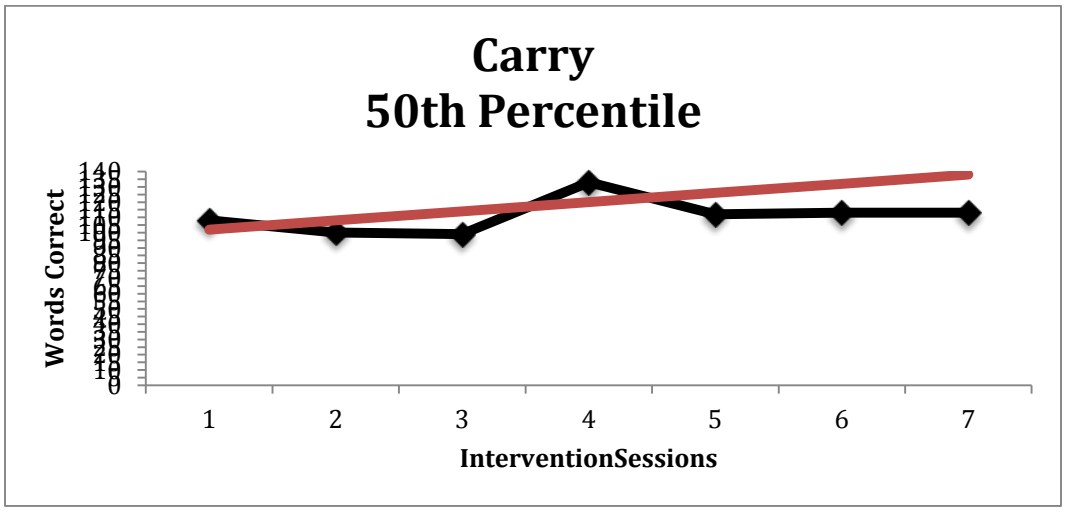

Figure 6: Carry's Aimline

An absolute level change did not occurred upon initial exposure to intervention (an increase of only one word per minute) and there was no functional relationship between the IV and DV. There was a relative level change of improvement with an average of 94 (r. 81-107) words correct during baseline and an average of 111 (r. 99-133) words correct during intervention. - An increase of 17 words per minute. After Carry's initial baseline score of 101, her scores on the next two sessions decreased indicating a downward trend. The data variability continued until week seven after which, the data stabilized. Her data remained stable until week 13 when her score improved by 34 words a minute. Her score decrease to 114 words the following week and her scores remained stable for the duration of the study.

Carry received seven weeks of intervention and all but two reading scores fell below the aimline. Her lowest score in treatment was week 12 (99 words) and her highest score was the following week (133 words). The score of 133 during week 13 was 5 words short of obtaining her end of the year reading goal of 138 words. Carry's scores for the final three weeks of the study decreased by 21 words and she never obtained her end of the study reading goal.

An absolute level change did not occur on the number of words read incorrectly (2 less words read incorrectly). However, a deteriorating relative level change occurred with an average of 10 (r. 2-19) words read incorrectly during baseline and an average of 2 (r. 1-3) words read correctly during treatment. Carry's number of words read incorrectly (see Figure 2) during baseline corresponded to her declining reading scores during week two and three. A downward trend in the data occurred during week four and the data stabilized through baseline with an average 7 (r. 2-10).

4.1.5 Rae

Rae was the final participant to enter treatment due to the variability in her baseline data and behavior issues during CBM sessions. During the screening process, Rae was placed on the 2nd grade PRF and her end of the year reading goal was 100 words a minute (50th percentile). An absolute level change did not occur (an increase of 1 word per minute) and a relative level change also did not occur with an average of 18 (r. 10-23) words read during baseline and an average of 21 (r. 21-25) during treatment.

The data presented on Rae's aimline (see Figure 7) shows the discrepancy between her median score and her end of the year reading goal – a difference of 83 words. In addition to the large numerical difference, Rae only received treatment for four weeks before the study concluded. Nonetheless, Rae highest reading score of 25 words occurred during intervention on week 15. All of her reading scores during intervention were below the aimline and zero instructional changes occurred due to the study concluding after the fourth data point.

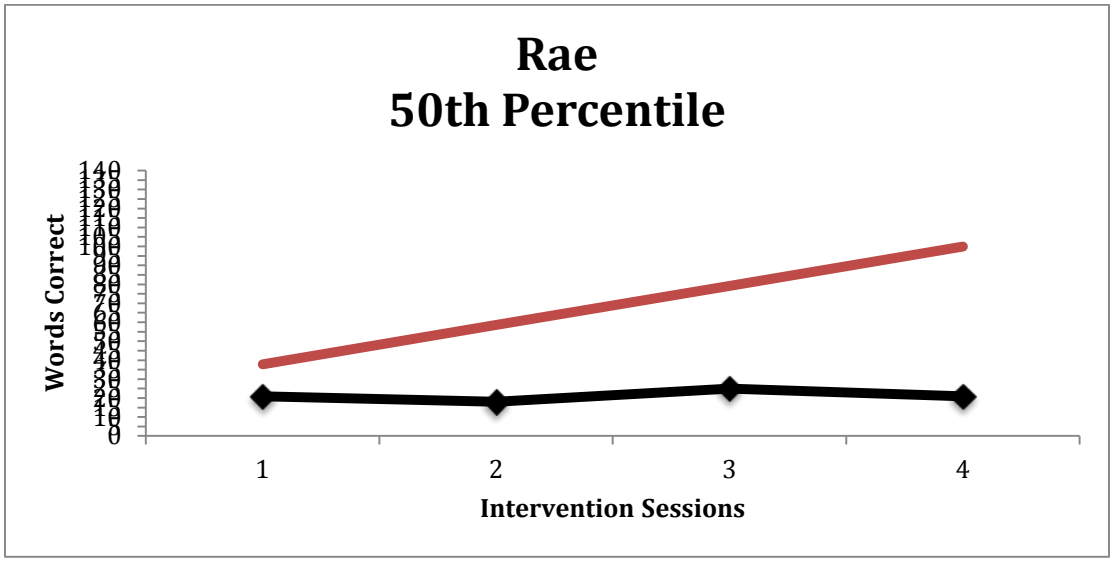

Figure 7: Rae's Aimline

Rae's data for words incorrect indicate that an absolute level change did not occur (an increase of 5 words read incorrectly per minute). Also, a relative level change did not occur with an average of 13 (r. 3-19) words read incorrectly during baseline and average of 12 (r. 9-19) words read incorrectly during treatment.

4.2 DOES TEACHER USE OF READING CURRICULUM BASED MEASUREMENT (CBM), STUDENT CONSULTATION, AND GOAL SETTING LEAD TO INCREASES IN THE AMOUNT OF READING INSTRUCTION PROVIDED TO STUDENTS WITH ID?

The amount of reading instruction for Jack, Carry, and Kevin increased during intervention. Table 2 displays the median amount of weekly reading instruction minutes provided to each participant during baseline and intervention. Jack's reading instruction increased by six minutes and Kevin's reading instruction increased two minutes a week. Carry's had the largest increase in weekly instructional minutes with 13 more minutes of weekly instruction occurring during intervention. Rae was the only participant whose minutes actually decreased during intervention. This may be attributed to her extended stay in baseline (i.e. 12 weeks) compared to her time in intervention (i.e. 4 weeks).

Table 2: Average Median Minutes of Weekly Reading Instruction

Student	Baseline	Intervention
Jack	32	38
Kevin	37	39
Carry	40	53
Rae	22	16

4.3 BPST-III

Each participant was administered the BPST-III twice to measure common consonant sounds, the short sound for each vowel, and words representing 12 different phonetic patterns. The informal assessment was administered once prior to baseline and once after week 16 of the study. All students demonstrated reading growth on various sections of the assessment. However, due to each student's individual reading levels, not all sections of the BPST-III were administered to each participant. Jack and Kevin were assessed on the first three sections (consonant sounds, short vowel, and CVC). Rae attempted the first eight sections before the assessment was stopped due to four consecutive non-responses and Carry was the only participant to finish all 14 sections of the assessment.

4.3.1 Jack

Table 3 displays Jack's scores on the BPST-III during pre- baseline and post-intervention. Jack's score on consonant sounds was 48% (10/21) during pre-baseline and during post intervention he increased his score to 20 correct sounds out of a possible 21. Jack also increased his short vowel reading by 60%, the only sound he incorrectly read on the post intervention assessment was the short /e/. The assessment was halted during both pre and post sessions after Jack was unable to read four consecutive CVC words.

Table 3: BPST-III Jack

Skill	Pre	Post
Consonant Sounds	10/21 (48%)	20/21 (95%)
Short Vowel	1/5 (20%)	4/5 (80%)
CVC	0/10 (0)	0/10 (0)

4.3.2 Kevin

Kevin's scores from the consonant section of the BPST-III increased (see Table 4) from 17 letters read correctly to 21 read correctly during post intervention administration. Kevin's greatest increase occurred on the short vowel section. He went from reading zero vowels in pre baseline to reading all vowels post intervention. Similar to Jack, Kevin was unable to read any CVC words and the assessment was stopped after four unsuccessful reading attempts.

Table 4: BPST-III Kevin

Skill	Pre	Post
Consonant Sounds	17/21 (81%)	21/21 (100%)
Short Vowel	0/5 (0)	5/5 (100%)
CVC	0/10 (0)	0/10 (0)

4.3.3 Carry

Out of the 14 sections on the BPST-III, Carry scores on pre baseline to post intervention remained identical. She scored 100% on both pre baseline and post intervention administrations for consonant sounds, consonant diagraph, consonant blends, final e, and other vowel diagraph (see Table 5). Carry increased her scores on five sections but scores decreased on two measures (CVC and affixes). Her greatest increases occurred on short vowels (increased from 0 to all 5 correct), inflection (increased from 0 to 4 correct), and 2 syllable words (increased from 0 to 4 correct). She had the most difficulty reading words with more than 3 syllables.

Table 5: BPST-III Carry

Skill	Pre	Post
Consonant Sounds	21/21 (100%)	21/21 (100%)
Short Vowel	0/5 (0)	5/5 (100%)
CVC	10/10 (100%)	9/10 (90%)
Consonant Diagraph	5/5 (100%)	5/5 (100%)
Consonant Blends	5/5 (100%)	5/5 (100%)
Inflection	0/5 (0)	4/5 (80%)
Final e	5/5 (100%)	5/5 (100%)
Long Vowel Diagraph	4/5 (80%)	4/5 (80%)
r-Controlled	4/5 (80%)	5/5 (100%)
Other Vowel Diagraph	5/5 (100%)	5/5 (100%)
2 Syllable	0/5 (0)	4/5 (80%)
Affixes	5/5 (100%)	4/5 (80%)
3-4 Syllable	3/5 (60%)	4/5 (80%)
3-5 Syllable	3/5 (60%)	3/5 (60%)

4.3.4 Rae

Rae attempted eight sections (see Table 6) of the BPST-III before administration was stopped because of four consecutive non-responses. She had reading scores increase for five of the eight

sections (consonant sounds, short vowel, CVC, consonant diagraph, and consonant blends) administered. Her greatest reading score increase occurred on the short vowel section. She went from reading two short vowels to reading all five correctly. She did however continue to struggle with reading CVC words. She read five CVC words pre baseline and only increased her CVC reading by one word during the post intervention session.

Table 6: BPST-III Rae

Skill	Pre	Post
Consonant Sounds	19/21 (90%)	21/21 (100%)
Short Vowel	2/5 (40%)	5/5 (100%)
CVC	5/10 (50%)	6/10 (60%)
Consonant Diagraph	3/5 (60%)	5/5 (100%)
Consonant Blends	2/5 (40%)	3/5 (60%)
Inflection	5/5 (100%)	5/5 (100%)
Final e	0/5 (0)	0/5 (0)
Long Vowel Diagraph	1/5 (20%)	0/5 (0)

4.4 SOCIAL VALIDITY

A seven question survey was sent electronically to all teachers involved in the study. The response rate was 100% and the results are displayed in Table 7. All teachers reported CBM was easy to administer but split on what they liked most about the intervention. Rae and Kevin's

teachers liked weekly CBM the best and Carry and Jack's teacher liked sharing weekly reading data with students. All teachers with the exception of Rae's reported observing reading improvements in their respective students and will continue to use CBM. The same three teachers completely agreed that weekly visual data was helpful in achieving the reading goals. They also believed that each student was making progress towards his or her reading goal.

Table 7: Teacher Survey

Questions	Rae's Teacher	Jack's Teacher	Kevin's Teacher	Carry's Teacher	Average
1. CBM was easy to administer weekly	5	5	5	5	5
2. I observed improvements with my student's CBM reading throughout the 16 weeks.	3	4	5	4	4
3. The CBM grade level was appropriate for my student.	3	4	5	4	4
4. The weekly visual data (i.e. graph and aimline) was helpful in determining my student's reading progress towards his or her goal.	3	5	5	5	4.5
5. If provided to me, I will continue to use CBM as a progress-monitoring tool.	3	5	5	5	4.5
6. My student is making adequate progress towards meeting his or her end of the study reading goal (as determined on the graph/aimline)	3	4	5	4	4
7. What I liked most about the intervention.	Weekly CBM	Sharing data with student	Weekly CBM	Sharing data with student	

Note. 1= Completely Disagree, 2= Partially Disagree, 3= Neither Agree or Disagree, 4= Somewhat Agree, 5= Completely Agree

A second electronic survey for the students containing four questions was sent to each teacher. A 75% response rate was achieved with Rae being the only student to not respond. Rae's

teacher did attempt to assist her in answering the questions but was unable to elicit a response from her. The participant's answers are displayed in Table 8. Jack, Kevin, and Carry enjoyed weekly CBM sessions but Kevin indicated that he would not like to continue the sessions. The same three students believe that they can now read more words or letter sounds and only Jack and Carry now feel like they read faster.

Table 8: Student Survey

Questions	Jack	Kevin	Carry	Rae	Average
1. I enjoyed the weekly timed reading sessions.	5	5	5	NR	5
2. I can now read more words or letter sounds.	5	4	5	NR	4.7
3. I can now read faster.	5	3	5	NR	4.3
4. I would like to continue weekly timed reading sessions with my teacher.	5	1	5	NR	3.7

Note. 1= Completely Disagree, 2= Partially Disagree, 3= Neither Agree or Disagree, 4= somewhat Agree, 5= Completely Agree
NR= No Response

5.0 DISCUSSION

Providing effective reading instruction for students with ID has been a challenge for teachers over the past several years (Kliewer & Bilken, 2001). Adding to the challenge is the recent emphasis placed on teachers to use evidence-based strategies to increase student's reading abilities (e.g., National Institute for Literacy, 2001). Thankfully, there is a growing body of research focusing on evidence based reading interventions (i.e., phonics based) for students with ID (Allor, Mathes, Roberts, Cheatham, & Champlin, 2010; Allor, Mathes, Roberts, Jones, & Champlin, 2010; Browder, Ahlgrim-Delzell, Flowers, & Baker, 2012; Conners, Rosenquist, Sligh, Atwell, & Kiser, 2006; Finnegan, E. G., 2012; Fredrick, Davis, Alberto, & Waugh, 2013; Joseph, 2002). Despite the growing literature base, researchers have traditionally limited their focus to the acquisition of isolated reading skills or the teaching of a small amount of letter sounds or words to students with ID (Bradford, Shippen, Alberto, Houchins, & Flores, 2006; Flores, Shippen, Alberto, & Crowe, 2004; Tucker Cohen, Heller, Alberto, & Fredrick, 2008; Waugh, Fredrick, & Alberto, 2009). That being said, in recent years a small number of researchers have started to expand the focus to include measuring fluency of students with ID through the use of modified CBM (Tindal, McDonald, Tedesco, Glasgow, Almond, Crawford, & Hollenbeck, 2003; Wallace, Ticha, & Gustafson 2008).

Fluency is a complex skill that involves the translation of text with accuracy and speed (Adams, 1990) that typically develops during elementary school. Fluency is also the most salient

characteristic of skillful reading (Fuchs, Fuchs, Hosp, & Jenkins, 2001; Logan, 1997) so understandably; students with ID demonstrate difficulty when it comes to reading fluently (Conners, Atwell, Rosenquist, & Sligh, 2001). Despite the reported success of using a modified CBM with students with ID by a limited number of researchers, questions remain regarding the efficacy and relevance of CBM use with this population of students.

Therefore, the purpose of this study was to determine if reading scores and reading instruction for four students with ID would increase over 16 weeks as a result of teacher's weekly use of reading CBM, student consultation and goal setting. Questions that guided the study examined: Does teacher use of reading CBM, student consultation, and goal setting lead to increases in CBM performance of student with ID? And, does teacher use of reading CBM, student consultation, and goal setting lead to increases in the amount of reading instruction provided to students with ID? Results indicate that CBM scores increased for all students and the amount of weekly reading instruction increased for three of the four students. However, only two students achieved their respective end of the year reading goals and limitations associated with the experimental design may have limited the amount of time needed to properly determine the effect of the IV on the DV.

Regardless, results from this study are consistent with the existing literature. Students with ID who receive phonics-based instruction are capable of making reading gains despite having a wide range of reading abilities (Allor et al., 2010; Bradford et al., 2006; Finnegan, 2012). Another finding was that the two students exposed to intervention the longest (i.e., Jack and Kevin) demonstrated the greatest reading gains. The need for maximum time/exposure to reading interventions before results are evident is consistent with findings from other studies (Allor, et al., 2010; Bradford et al., 2006; Flores et al., 2004; Frederick et al., 2014). Although

CBM scores for all students increased, a functional relationship was not established between the independent variable and dependent variable. Possible explanations for why a relationship was not established are discussed next.

5.1 READING INSTRUCTION.

The results indicate that reading scores on weekly CBM and the BPST-III improved for all four participants but each data trend with the exception of Jack indicated a continual increase starting in baseline and continuing through intervention. It's possible that the weekly exposure to CBM coupled with ongoing related reading instruction naturally increased Carry, Kevin, and Rae's scores. All three received some form of daily phonics based reading instruction and that included phonological awareness. Hypothetically, the intervention may have been more effective if all students did not already regularly receive phonics based reading instruction and were only taught sight words, similar to the students in the study conducted by Frederick and colleagues (Frederick, Davis, Alberto, & Waugh, 2013).

5.1.1 Intervention content.

All four students reduced the number of words/letter sounds read incorrectly by the end of the study but only Jack had a dramatic reduction. On week seven, Jack's letter sounds read incorrectly declined from 37 on week six to six on week seven. An explanation for the drastic drop is that the intervention did not have an immediate reinforcing effect on Jack and it took three weeks of exposure to intervention before Jack connected verbal praise from his teacher

with reaching the highlighted letter sound on CBM. In other words, it took Jack longer to process what was expected of him.

In addition to CBM, student consultation, and goal setting, a more intensive reading intervention may have been needed. Students in the current study might have benefitted from a curriculum targeting specific reading deficits similar to Bradford et al., (2006) who implemented the *Corrective Reading Program,* a phonics based curriculum to target fluency of students with ID. Or a comprehensive phonics based reading intervention targeting various reading skills of a large sample of students with ID designed and used by Allor and colleagues (Allor et al., 2010).

5.1.2 Grade levels.

One challenge with exploring the use of CBM with students with ID is how to most appropriately place students in below-grade level measures. Researchers have attempted to solve this issue by using norm benchmarks as cutoff points for students (Lemons et al., 2013). Consequently, procedures similar to the ones used by Lemons et al. (2013) were used in this study to establish appropriate grade levels in addition to appropriate measures (i.e. LSF, PRF, etc.). The results were mixed with two students being appropriately placed on grade level and measure (Jack and Kevin) and two students not being appropriately placed (Carry and Blue).

By all indications, Carry was the strongest reader of the four students based on her performance on assessments during screening. Prior to baseline, Carry scored 112 - just below the 50th percentile (116 words) on the 3rd grade PRF and was subsequently placed on the 4th grade PRF. The rationale to place Carry on the 4th grade PRF was because she almost scored at the 3rd grade 50th percentile benchmark and the assumption was that she would surpass the benchmark quickly (i.e. the first weeks of baseline).

Unfortunately, Carry did not surpass the 3rd grade benchmark during baseline and I realized mid way through her intervention phase the 4th grade PRF was too difficult. For example, Carry had trouble with words containing three or more syllables. When she would encounter a three-syllable word, she demonstrated difficulty decoding the word. Her struggles with multi-syllable words made her lose critical seconds during her timed reading. In retrospect, the 3rd grade PRF was the appropriate measure. My assumptions are consistent with Lemons et al. (2013) findings where the authors reported only .3% of 6th graders with ID achieved the 50th percentile benchmark on the 4th grade PRF.

Similar findings apply to Rae who struggled on the 2nd grade PRF measure throughout baseline. The rationale to have Rae remain on the 2nd grade PRF was to see what would happen to her scores once intervention was introduced. Unfortunately, her passage reading only slightly improved during intervention. Questions remain about whether or not a different measure (i.e. word reading fluency) or lower grade level would have been more appropriate for Rae. Results from a previous study indicate that only 1.9% of 4th grade students with ID meet CBM benchmarks on the 2nd grade WRF (see Lemons et al., 2013). These results would be consistent with Rae's CBM performance if she did not also have a previous diagnosis of autism. Confounding the situation is that students with autism outperformed students with ID on passage reading fluency and word reading fluency measures in the study conducted by Lemons et al. (2013).

The a priori hypothesis was that weekly reading instruction minutes would significantly increase as teachers identified specific reading deficits during intervention. Although, weekly reading instruction minutes increased during intervention for three of the four students (Jack, Kevin, and Carry), the increase was minimal. One possible explanation for the slight increase in

minutes is that all four students received reading instruction within a special education self-contained classroom. Teachers working in self-contained classrooms typically only spend an estimated 16% of their total day teaching academics (Vannest & Hagan-Burke, 2010).

When special education teachers are providing academic instruction, they must accommodate a group of learners that possess a broad range of academic ability (Jones & Brownell, 2014; Nichols & Sosnowsky, 2002). For example, one student may need phonological awareness instruction and another student may need to focus on comprehension or decoding so the teacher must divide her time accordingly to accommodate both students (Brownell et al., 2009). Furthermore, academic success is just one of many outcomes (e.g. positive behavioral, adaptive, communication, and transition goals) teachers must address when serving students with disabilities. All of these factors add up to a very limited amount of time during the school day to increase instructional minutes for students who are already difficult to engage and generally avoid academic tasks (Brownell, Smith, Crockett, & Griffin, 2012; Seo, et al., 2008).

5.2 LIMITATIONS

There were two limitations associated with the current study. First, the use of two different CBM measures did not allow for the possibility of three replications across students. The rationale for using two measures was the inability to recruit three or more students with comparable reading abilities so that the same measure could be used across all students.

Second, time influenced the current study. Due to time constraints for data collection, the multiple baseline across participants design was implemented in an abbreviated timeline of 16 weeks. This limited timeframe likely affected the study in at least two ways. First, intervention

was introduced to students on a predetermined schedule of four weeks. This design decision limited the ability to detect changes in student's reading performance that may have required additional time. For example, an instructional change never occurred for Carry or Rae. With respect to Carry, the study concluded prior to her fourth data point below the aimline. More time would have allowed an instructional change to occur. Rae did not enter intervention until week 12 and after four consecutive weeks of scoring below her aimline the study concluded after week 16. Thus preventing her teacher from implementing an initial instructional change that may have resulted in an increased CBM score.

Second, the total duration of intervention (between 4 and 12 weeks per student) is substantially shorter than that reported in previous studies (Fuchs, et al., 1991). With the exception of Jack, 16 weeks may not have been sufficient time to capture reading growth for the other three students. Thus, a design other than multiple baseline across participants may have allowed for a better evaluation of the research questions.

5.3 IMPLICATION FOR PRACTITIONERS

Providing effective reading instruction to students with ID continues to be a challenge for teachers due to the heterogeneous nature of this group of learners coupled with a scarcity of available curricula tailored to this group of learners (Browder, Ahlgrim-Delzell, Flowers, & Baker, 2012). For example, in the current study the intervention was appropriate for three of the four students. The exception was Rae due to her behavioral outbursts and daily exposure to behavioral based instruction (i.e. verbal behavior). Prior to baseline, Rae was attentive and completed all screening assessments and there was no indication of maladaptive behavior.

Once the study began, Rae demonstrated self-injurious behavior and aggression towards staff to escape from CBM sessions. Her behaviors during multiple CBM sessions resulted in lower scores due to time elapsing and assessments being halted or rescheduled. Also, her teacher revealed during week 12 of the study information regarding a previous primary disability label of autism that was recently changed to ID. Lastly, due to her secondary disability of autism, Rae received daily sight word instruction with an emphasis on verbal behavior. Sight word instruction does not require pre requisite reading skills like phonological awareness (Allor et al., 2013) so exposure to CBM was probably unfamiliar if not confusing to Rae.

Although not appropriate for Rae, other students responded positively to the intervention. Jack, Kevin, and Carry indicated that they enjoyed the consultation with their teacher and all three completed every CBM session without incident. Jack especially liked the highlight LS each week and verbally expressed his enjoyment after reaching his weekly goal.

Teacher's use of reading CBM, student consultation and goal setting has potential to improve reading outcomes for students with ID and may also provide other benefits for teachers. First, CBM is an evidence-based practice that provides teachers an efficient, quick, and easy method to assess students and determine present levels of academic performance. Second, CBM can provide teachers with visual data that can be displayed on graphs and used to assist them in making more appropriate instructional changes that lead to higher student expectations (Fuchs, Fuchs, & Hamlett, 1989). Having said that, all teachers in the current study agreed that CBM was easy to administer and the weekly data was helpful for monitoring student reading progress. One example is Kevin's teacher added seven additional minutes of phonemic awareness instruction every day after identifying three consecutive CBM data points below his aimline. The instructional change resulted in his CBM scores increasing above his aimline.

5.4 FUTURE DIRECTIONS FOR RESEARCH

Reading intervention studies involving students with ID require a significant amount of time and some last for three years before results are evident (Allor et al., 2012). One suggestion for researchers is that future studies begin earlier in the school year and continue through the spring to allow for maximum exposure to intervention. If future researchers decide to use single case design, one suggestion would be for a more thorough screening process. The extensive screening process would assist researchers in obtaining a deeper understanding of potential students' reading capabilities and use that knowledge to properly place students on appropriate measures of CBM (e.g. LS versus PRF). A longer screening process in the current study may have prevented the need for Carry and Rae to be on different grade levels and measures of CBM.

In addition to a longer screening process, future researchers should evaluate the duration of their study and then select the experimental design most appropriate. In the current study, the multiple baseline across participants design was appropriate for the intervention but one limitation of the design was the amount of time required for students to enter the intervention phase (i.e., every four weeks).

Other questions remain regarding the intervention especially how reinforcing the intervention was to the students. Kevin and Rae seemed to be unaffected by the verbal and physical praise delivered by their respective teachers during consultation. Perhaps a reinforcer embedded within the consultation and tailored to each student's personality would have been more effective. For example, Rae preferred having her head rubbed versus receiving a 'high five' or 'fist bump'. Future researchers may want to consider alternative reinforcers such as token economy systems or a personal preference inventory to help motivate the students.

5.5 CONCLUSIONS

Although a functional relationship was not established, results from the current study contribute and extend the research on the use of phonics-based interventions for students with ID. As stated previously, both Jack and Kevin achieved their reading goal and Carry was close to meeting her goal. The one instructional change that occurred during Kevin's intervention was effective and resulted in higher CBM scores. His teacher used the weekly CBM data to identify a specific skill deficit (i.e., reading short vowel sounds) and addressed it appropriately. In sum, evidence based practices need further examination when implemented to students with ID. However, components of the intervention in the current study were effective and with refinements and adjustments, better more effective interventions can be developed to meet the unique reading needs of students with ID.

APPENDIX A

RECRUITMENT LETTER

Dear Special Education Teacher:

David Hill is a researcher in the School of Education at the University of Pittsburgh. He will be conducting a study this year focused on the effect of using informal assessment data on reading instruction changes by teachers and on the reading performance of students with intellectual disability (ID). You are being contacted because you have been identified as a special education teacher for this 2013-2014 academic year and who is teaching an eligible student. To be eligible, a student must: (a) be in special education and have an Intellectual Disability (ID) as her or his primary disability; (b) be in grades 3 (if the student has repeated the 3rd grade), 4, or 5 during the 2013-2014 school year; (c) who have taken the *PASA* Level B or C during the spring 2013 administration, and (d) be a native speaker of English.

If you are selected and successfully complete the study, you will be allowed to keep the technology (i.e. Samsung Galaxy Tablet 2 (10.1-Inch, Wi-Fi) with case) and instructional materials used during the study. Additionally, you will receive an honorarium of $200.00 as a "Thank you" for your participation. Please contact **David Hill** ASAP if you are interested or have additional questions. Email - **drh53@pitt.edu** and office number, **412- 624 – 7251**

APPENDIX B

RESEARCH APPROVAL LETTER FROM THE UNIVERSITY OF PITTSBURGH INSTITUTIONAL REVIEW BOARD

University of Pittsburgh
Institutional Review Board

Memorandum

To: David Hill

From: Christopher Ryan, Vice Chair

Date: 10/3/2013

IRB#: PRO13080381

Subject: Reading improvement through informal assessment for students with intellectual disability (RITA).

The University of Pittsburgh Institutional Review Board reviewed and approved the above referenced study by the expedited review procedure authorized under 45 CFR 46.110 and 21 CFR 56.110. Your research study was approved under:
45 CFR 46.110(5)
45 CFR 46.110(6)
45 CFR 46.110(7)

This study has been approved under 45 CFR 46.404 for the inclusion of children. The IRB has determined that the written permission of one parent is sufficient.

The risk level designation is Minimal Risk.
Approval Date: 10/2/2013
Expiration Date: 10/1/2014

For studies being conducted in UPMC facilities, no clinical activities can be undertaken by investigators until they have received approval from the UPMC Fiscal Review Office.

Please note that it is the investigator's responsibility to report to the IRB any unanticipated problems involving risks to subjects or others [see 45 CFR 46.103(b)(5) and 21 CFR 56.108(b)]. Refer to the IRB Policy and Procedure Manual regarding the reporting requirements for unanticipated problems which include, but are not limited to, adverse events. If you have any questions about this process, please contact the Adverse Events Coordinator at 412-383-1480.

The protocol and consent forms, along with a brief progress report must be resubmitted at least one month prior to the renewal date noted above as required by FWA00006790 (University of Pittsburgh), FWA00006735 (University of Pittsburgh Medical Center), FWA00000600 (Children's Hospital of Pittsburgh), FWA00003567 (Magee-Womens Health Corporation), FWA00003338 (University of Pittsburgh Medical Center Cancer Institute).

APPENDIX C

PRINCIPAL PERMISSION FORM

Principal Investigator: David R. Hill | 412.624.7251 | drh53@ pitt.edu

Study Title: Reading Improvement Through informal Assessment for Students with Intellectual Disabilities

(Project RITA)

Dear Principal,

I am writing you this letter to inform you about Project RITA (Reading Improvement Through informal Assessment for Students with Intellectual Disabilities), a research study that is being conducted by the University of Pittsburgh. The study will examine the effect of using informal assessment data on reading instruction changes by teachers and on the reading performance of students with intellectual disability (ID). This study will focus on the use of curriculum-based measurement (CBM) as a progress-monitoring tool for students with ID who take the Pennsylvania Alternate System of Assessment (PASA). I am interested in 4th and 5th grade students who (a) have been identified as having an Intellectual Disability as their primary disability and (b) have taken the *PASA* Reading Level B or C last year (as indicated by the *PASA* database).

If a teacher in your school agrees to participate in the research study, they will document reading instruction on a daily basis and will also be asked to take part in a series of classroom observations over the course of the school year as well as an interview about the focus of reading instruction, the match between student reading level and instruction, the overall engagement of the target student, and finally their opinions regarding overall instructional quality and the impact of the informal reading assessment on their reading instruction. Teachers will be eligible to keep the technology instructional materials utilized in this study and receive an honorarium for their full participation.

The information gathered has the potential to improve reading instruction provided to children with significant cognitive disabilities in Pennsylvania and to enhance the participation of these children in the state accountability system. Additionally, we will provide you with a summary report of overall study findings at the end of the study.

Please feel free to contact me directly if you would like more information or have questions about any part of this letter.

Sincerely,

David R. Hill

Principal Permission Form

Reading Improvement Through informal Assessment for Students with Intellectual Disabilities (Project RITA)

___ **YES**, I provide permission for this research to take place at my school. No additional procedures are required by our district for approval.
___ **YES**, I provide permission for this research to take place at my school. *However*, <u>additional procedures are required</u> in our district before the study can be approved. (*Note:* We will follow up with you and complete the required procedures prior to initiating the study.)
___ **NO**, I do not provide permission for study to take place at my school.

_____
Principal Name

_____
School District

_____ _____
School Name School Phone

_____
School Address

_____ _____
Principal Signature Date

APPENDIX D

TEACHER CONSENT FORM

Consent to Act as a Participant
Project RITA

Principal Investigator: David R. Hill | 412.624.7251 | drh53@ pitt.edu
Study Title: Reading Improvement Through informal Assessment for Students with Intellectual Disabilities
(Project RITA)

Dear Special Education Teacher:

I am a researcher in the School of Education at the University of Pittsburgh. I am conducting a study focused on the effect of using informal assessment data on reading instruction changes by teachers and on the reading performance of students with intellectual disability (ID). This study will focus on the use of curriculum-based measurement (CBM) as a progress-monitoring tool for students with ID who take the Pennsylvania Alternate System of Assessment (PASA). This study will focus on 4th and 5th grade students who (a) have been identified as having an Intellectual Disability as their primary disability and (b) have taken the *PASA* Reading Level B or C during the last administration. ***I would greatly appreciate your participation in this study***. Please contact me if you have any questions or need any additional information after reading this letter.

Why is this research being done?

The purpose of this project is to examine how CBM data effects instructional changes by teachers on reading instruction for students with ID. One outcome will be recommendations for targeted inservice programs for teachers. Another outcome will be improving the reading subtest of the annual alternate assessment (*PASA).*

Who is being asked to take part in this research study?

You are being contacted because you have been identified as a special education teacher for the 2013-2014 academic year who is teaching an eligible student. To be eligible, a student must: (a) be in special education and have an Intellectual Disability as her or his primary disability; (b) be in the 3rd, 4th, or 5th grade during

the 2013-2014 school year; (c) have taken the *PASA* Level B or C during the most recent administration, and (d) be a native speaker of English.

What will I be asked to do if I participate?

If you decide to participate, you will be asked to do the following activities (*A consent Form Collection Checklist for you to keep is included with this form. This may assist you in completing these steps*):

- First, I would ask you to read this consent form carefully, contact me with any questions. Then, you would be asked to complete the information at the end of this letter and return it to me at your earliest convenience. I will provide you with a copy of this form.
- Second, you would obtain permission from your principal to participate in the study and you would have the principal complete the final page of this consent form.
- Third, if you are accepted for the study, you would be asked to distribute and collect consent forms to and from the parents/legal guardians of your eligible student.
- Fourth, you would allow yourself to be observed weekly teaching a reading lesson to your student.
- Fifth, you will be asked to document reading instruction by type and duration daily through an instructional log.
- Sixth, you will administer a brief (approx. 3-5 minutes) reading assessment to your participating student each week.

What are the potential risks of this study?

Your participation in this study poses minimal risks. Possible inconveniences will be the time spent scheduling and participating in classroom observations and maintaining a daily log of reading instruction delivered. There is a possibility you may experience discomfort from being interviewed and observed and there is an unlikely risk for a breach of confidentiality. Procedures will be in place to minimize the inconvenience and discomfort you may experience and all precautions will be taken to ensure confidentiality of all collected data.

What are the potential benefits of taking part in this study?

This study will provide you with tools that will assist you in your daily reading instruction planning. Also, the information you provide has the potential to improve reading instruction provided to children with intellectual disabilities in Pennsylvania and to enhance the participation of these children in the state accountability system (PASA). Additionally, a report will be provided to you with a summary of the overall findings from the study.

Will I be paid if my student takes part in this research study?

On the satisfactory completion of this study, you will be allowed to keep the technology (video recorder) and instructional materials used during the study. Additionally, you will receive an honorarium as a "Thank you" for your participation.

Who will know about my participation in this research study?

Any information about you or your students obtained from this study will be kept confidential. Reports will not name any individual or school. Video recordings will be used only for research purposes unless permission is provided to use these in professional presentations. Recordings will be stored in a secure, locked office at the University of Pittsburgh. No identifying information will be included in the transcription of the recordings.
In unusual cases, your research records may be released in response to an order from a court of law. It is also possible that authorized representatives from the University of Pittsburgh Research Conduct and Compliance Office may review your data for the purpose of monitoring the conduct of this study. Also, if the investigators learn that you or someone with whom you are involved is in serious danger or potential harm, they will need to inform the appropriate agencies, as required by Pennsylvania law.

Is my participation in this research study voluntary?

Your participation in this research study is completely voluntary. If you decide not to take part, please understand that no negative consequences will occur. Finally, if you agree to participate, please understand that your participation is voluntary and you may withdraw at any time. If you do withdraw, this will not affect any other activities you participate in at your school or with the University of Pittsburgh, but you will be expected to return all technology. If you decide to withdraw please contact me, the principle investigator, David R. Hill, at drh53@pitt.edu or 412.624.7251.

If the participating student/s in your classroom withdraws from the study, you may be given the opportunity to complete the study with another student. This will depend on the time of the year the participating student withdraws from the study. I will work with you to maintain your student's participation in this event, but continued participation is not guaranteed.

Who do I contact if I have questions?

If you would like more information or if you have questions about any part of this letter, you may contact me, the principal investigator, David R. Hill. Also, if you have any general questions about giving consent or about your rights as a research participant, you may call the Human Subject Protection Advocate at the University of Pittsburgh at 1-866-212-2668.

If you would like to participate, please complete the form below and return it to me via mail, fax, or email (scan) at the address below at your earliest convenience. Thank you very much.

Project RITA
Attn: David R. Hill, Principal Investigator
University of Pittsburgh, Department of Instruction & Learning
5300 Posvar Hall, 230 S. Bouquet St.
Pittsburgh, PA 15260

Sincerely,

If you would like a postage-paid return envelope, please contact David R. Hill at drh53@pitt.edu and provide your name and mailing address.

David R. Hill
Principal Investigator, Project RITA
412.624.7251 | drh53@pitt.edu
Department of Instruction & Learning
University of Pittsburgh
5155 Posvar Hall, 230 S. Bouquet St., Pittsburgh, PA 15260

CONSENT FORM FOR:

Project RITA: Reading Improvement Through informal Assessment for Students with Intellectual Disabilities

Please complete all items and return at your earliest convenience.

1. Please check one of the following choices:

____ **YES**, I agree to participate in the study.

I understand the information above and have had all of my questions answered. I understand that I am encouraged to ask questions, voice concerns or complaints about any aspect of this research study during the course of this study, and that such future questions, concerns or complaints will be answered by a qualified individual or by the investigator(s) listed on the first page of this consent document at the telephone number(s) given. I understand that I may always request that a listed investigator address my questions, concerns or complaints. I understand that I may contact the Human Subjects Protection Advocate of the IRB Office, University of Pittsburgh (1-866-212-2668) to discuss problems, concerns, and questions; obtain information; offer input; or discuss situations in the event that the research team is unavailable. A copy of this consent form will be given to me.

_____ _____
Name Date

_____
Signature

(Continue to next page)

2. Permission to Include Audio / Video in Professional Presentations *(Optional)*

☐ **YES**, I agree to give permission for research staff to use my audio and/or video recording collected as part of these studies during professional presentations. I understand that my name or school will not be disclosed, but I may be identified if an audience member recognizes my voice and/or face. I understand that I do not have to give this permission for my participation in this study and that my participation and/or selection for the study will not be affected by my choice to allow or NOT allow my audio and/or video recordings to be shared.

☐ **NO**, I DO NOT agree to give permission for research staff to use my audio and/or video recording collected as part of these studies during professional presentations. I understand that I do not have to give this permission for my participation in this study and that my participation and/or selection for the study will not be affected by my choice to allow or NOT allow my audio and/or video recordings to be shared.

3. Contact Information

Name: _____

School District Name: _____

School Campus Name: _____

Work Number & Email: _____

Home Phone or Cell Number: _____

APPENDIX E

PARENT/STUDENT CONSENT FORM

Principal Investigator: David R. Hill | 412.624.7251 | drh53@ pitt.edu
Study Title: Reading Improvement Through informal Assessment for Students with Intellectual Disabilities
(Project RITA)

Dear Parent:

I am a researcher in the School of Education at the University of Pittsburgh. I am conducting a study focused on the effect of using informal assessment data on reading instruction changes by teachers and on the reading performance of students with intellectual disability (ID). This study will focus on the use of curriculum-based measurement (CBM) as a progress-monitoring tool for students with ID who take the Pennsylvania Alternate System of Assessment (PASA). This study will focus on 4th and 5th grade students who (a) have been identified as having an Intellectual Disability as their primary disability and (b) have taken the *PASA* Reading Level B or C during the last administration. ***I would greatly appreciate your child's participation in this study***. Please contact me if you have any questions or need any additional information after reading this letter.

Why is this research being done?

The purpose of this project is to examine how CBM data effects instructional changes by teachers on reading instruction for students with ID. One outcome will be recommendations for targeted inservice programs for teachers. Another outcome will be improving the reading subtest of the annual alternate assessment (*PASA).*

Who is being asked to take part in this research study?

You are being asked to take part because your child is in the classroom of a participating teacher. Teachers were selected because they teach language arts in the qualifying grade level, they have students who are eligible for our state's alternate assessment (PASA), and because the school district has agreed to take part in the study.

What will my child be asked to do if I allow her or him to participate?

A brief reading-screening test would be administered once a week for the duration of the study. We would like you to review this letter and discuss the study with your child. If you have any questions, please contact me at the address or telephone number listed above.
If you allow your child to participate:

- Your child:
  - Will complete a brief weekly reading screening test (apx. 8 min)
- Your child's teacher:
  - will complete a daily log for up to seven months, indicating what lessons she or he taught the whole class. Additionally, your child's teacher may indicate which lessons she or he taught to your child.
  - will also document the time each day your child spent learning reading content.
- In the event that we are unable to obtain sufficient parent consent and child assent or if a teacher withdraws from the study, the participation of your child will be terminated. We will inform you of this by email or phone.

What are the potential risks of this study?

Your child's participation in this study poses minimal risks. There is an unlikely risk for a breach of confidentiality. However, we will have procedures in place to minimize this risk. Specifically, any forms completed by the teacher will have student names removed and replaced with an identification number, all computerized data collected (including the opportunity-to-learn tool and the screening) will be password protected and only project staff will have access to these data.

What are the potential benefits of taking part in this study?

This study may improve your child's reading skills. The information gained in the study will also further the ability of teachers to more effectively teach reading to students with intellectual disabilities.

Who will know about my child's participation in this research study?

Any information about you or your child obtained from this study will be kept confidential. Reports will not name any individual or school. Video recordings will be used only for research purposes unless permission is granted to use these in professional presentations. Recordings will be stored in a secure, locked office at the University of Pittsburgh. No identifying information will be included in the transcription of the recordings. In unusual cases, your child's research records may be released in response to an order from a court of law. It is also possible that authorized representatives from the University of Pittsburgh Research Conduct and Compliance Office may review your child's data for the purpose of monitoring the conduct of this study.

Is my child's participation in this research study voluntary?

Yes, your child's participation in this research study is completely voluntary. If you decide not to take part, please understand that no negative consequences will occur. Your decision to allow

your child to participate will not affect any other activities your child participates in at his or her school or with the University of Pittsburgh. Finally, if you agree to allow your child to participate, please understand that this participation is voluntary and you may withdraw your child at any time. If you do withdraw, this will not affect any other activities you participate in at your child's school or with the University of Pittsburgh. If you decide to withdraw please contact me, David R. Hill at drh53@pitt.edu or 412.624.7251.

Who do I contact if I have questions?

If you would like more information or if you have questions about any part of this letter, you may contact me, David R. Hill at drh53@pitt.edu or 412.624.7251. Also, if you have any general questions about giving consent or about your rights as a research participant, you may call the Human Subject Protection Advocate at the University of Pittsburgh at 1-866-212-2668.

If you would like to participate, please complete the form below and return it to us at your earliest convenience. Thank you very much.

Sincerely,

David R. Hill
Principal Investigator, Project RITA
412.624.7251 | drh53@pitt.edu
Department of Instruction & Learning
University of Pittsburgh
5155 Posvar Hall, 230 S. Bouquet St., Pittsburgh, PA 15260

CONSENT FORM FOR:
Project RITA

Principal Investigator: David R. Hill | 412.624.7251 | drh53@ pitt.edu
Study Title: Reading Improvement Through informal Assessment for Students with Intellectual Disabilities

Please complete all items and return to your child's teacher or to the address below at your earliest convenience. If you would like a postage-paid return envelope, please contact David R. Hill at drh53@pitt.edu or 412.624.7251 *and provide your name and mailing address*.

Project RITA
Attn: David R. Hill, Principal Investigator
University of Pittsburgh, Department of Instruction & Learning
5300 Posvar Hall, 230 S. Bouquet St.
Pittsburgh, PA 15260

1. Please check one of the following choices:
___ YES, I agree to allow my child, _____, to participate in the study. (first and last name)

___ NO, I do not want my child to participate in this study.

I understand the information above and have had all of my questions answered. I understand that I am encouraged to ask questions, voice concerns or complaints about any aspect of this research study during the course of this study, and that such future questions, concerns or complaints will be answered by a qualified individual or by the investigator(s) listed on the first page of this consent document at the telephone number(s) given. I understand that my child will be videotaped during the course of this study. I understand that I may always request that a listed investigator address my questions, concerns or complaints. I understand that I may contact the Human Subjects Protection Advocate of the IRB Office, University of Pittsburgh (1-866-212-2668) to discuss problems, concerns and questions, obtain information, offer input, or discuss situations in the event that the research team is unavailable. A copy of this consent form will be given to me. I understand that, as a minor (age less than 18 years), the above-named child is not permitted to participate in this research study without my consent. Therefore, by checking 'Yes' and signing this form, I give my consent for his/her participation in this research study.

_____ _____
Parent Name Date

_____
Parent Signature
(Continue to next page)

2. Permission to Include Video in Professional Presentations (Optional)

___ YES, I agree to give permission for research staff to use my child's video recordings

collected as part of this study during professional presentations. I understand that my child's name or school will not be disclosed, but that she or he may be identified if an audience member recognizes her or his voice or appearance. I understand that I do not have to give this permission for my child to participate in this study and that my child's participation and/or selection for the study will not be affected by my choice to allow or NOT allow her or his video recordings to be shared.

___ NO, I DO NOT agree to give permission for research staff to use my child's video recording collected as part of this study during professional presentations. I understand that I do not have to give this permission for my child to participate in this study and that her or his participation and/or selection for the study will not be affected by my choice to allow or NOT allow her or his video recordings to be shared.

3. Contact Information
Parent Name:_____

Child's Name:_____

Child's Grade:_____

Primary Parent Phone Number:_____

Alternate Phone Number:_____

Email Address:_____

Child's School District Name:_____

Child's School Campus Name:_____

Child's School Principal Name:_____Phone Number if Known:_____

Child's Special Education Teacher's Name:_____

(NOTE: You may stop. Next page is to be completed by project staff.)

Assent to Act as a Participant
Project RITA

THIS FORM WILL BE COMPLETED BY PROJECT STAFF

Principal Investigator: David R. Hill | 412.624.7251 | drh53@ pitt.edu
Study Title: Project RITA: Reading Improvement Through informal Assessment for Students with Intellectual Disabilities

1) Explain study to child in age appropriate language and allow child an opportunity to ask questions about the study. After answering any questions ask the child, "Do you agree to participate in this study?"

If 'Yes,' complete this page and proceed.
If 'No,' do not assess the child.

I certify that I have carefully explained the purpose and nature of this research study to the child in age appropriate language. He/she has had an opportunity to discuss it with me in detail. I have answered all his/her questions and he/she has provided affirmative agreement (i.e., assent) to participate in this study.

_____ _____
Project Staff Signature Date

_____
Project Staff's Printed Name

2) For children ages 14-17 or children less than 17 who are developmentally able to sign his/her name, read the statement below to the child and have her or him sign, date, and print name.

This research has been explained to me, and I agree to participate.

_____ _____
Signature of Child Date

_____
Printed Name of Child

APPENDIX F

PASSAGE READING FLUENCY CBM

Assessor Copy **Form 1-1**

Student Name: _____ Date: _____

1. Place the Student Copy in front of the student. Point to the names on the Student Copy as you read them:

   "**This is a story about Ann and Tom. I want you to read this story to me. You'll have 1 minute to read as much as you can. When I say "begin," start reading aloud at the top of the page. Do your best reading. If you have trouble with a word, I'll tell it to you. Do you have any questions? Begin.**"

2. Start the timer.
3. While the student is reading, mark errors with a slash (/).
4. At 1 minute, mark the last word read with a bracket (]).
5. When the student gets to a logical stopping place, say "**Stop.**"

Ann was seven years old. Her brother, Tom was nine. They were both very	14
excited. Today they were going to get a pet. They were going to get a puppy.	30
Ann hoped their new puppy would like to chase balls. She wanted to play with it	46
in the yard. She thought it would be fun to play chase with the puppy. Tom	62
hoped their new puppy would like to go for walks in the park. He wanted to	78
take it for walks with his friends and their dogs. Both children knew that	92
taking care of a puppy could be a lot of work. They promised their mom they	108
would be good pet owners.	113
It was time to go pick out their new puppy. Ann, Tom, and their mom got	129
in the car. They drove to the animal shelter in town. They parked the car and	145
went inside. Ann and her brother knew where to go. They had visited the	159
shelter before. They came to the shelter last year. They had adopted a cat	173
there.	174
Ann and Tom rushed into the main office area. They went to the part of	189
the shelter with dogs. The words "Dog Kennel" were written on the wall. They	203
saw two rows of metal cages. There was a cement hall in between them. They	218
could hear many dogs barking. The dogs were barking loudly. Ann and Tom	231
looked at each other. They smiled big smiles. They knew they would find their	245
new pet.	247

Total Words Read:_____ - # of Errors:_____ = CWPM:_____

APPENDIX G

WORD READING FLUENCY CBM

Assessor Copy **Form K-1**

Student Name: _____ Date: _____

Word Reading

Directions: Place the "Word Reading Student Copy" probe in front of the student and say, **"Please read from this list of words. Read across the page and then on to the next row."** Demonstrate by sweeping your finger from left to right across the first two rows of words. Start timing when the student begins reading. Mark a bracket] after the last word read. If a student self corrects, write S.C. above the word and count as correct. If they say an incorrect word, mark a ~~slash~~ through the word, and count as incorrect. If they hesitate more than 3 seconds, supply the word and count as incorrect. If a student skips a words, circle the word and count it as incorrect. **Note: This is a 60 second timed test.**

I	is	it	top	4
an	man	fast	miss	8
way	off	she	rock	12
my	can't	book	into	16
great	cut	say	think	20
wish	eat	are	family	24
all	tree	good	back	28
hand	boy	enter	wood	32
left	people	how	old	36
cover	area	grow	big	40
ball	stick	low	black	44
below	feeling	important	world	48
always	wheels	deep	forest	52
side	find	corner	become	56
dollars	life	branch	blow	60

 # Correct _____

APPENDIX H

LETTER SOUND FLUENCY CBM

Assessor Copy **Form K-1**

Student Name: _____ Date: _____

Letter Sounds

Procedures

Place the probe marked "Letter Sounds Student Copy" in front of the student. Read the directions to the student. When you are finished administering the test, enter the student results on the website for scoring and record keeping.

Directions

"When I say begin, say the sound each letter makes. I will stop you after 60 seconds. Start at the top of the page and read across each row." Demonstrate by sweeping your finger from left to right across the first row. **"Move your marker down after each row."** Demonstrate. **"Any questions?... Ready?...Begin."** At 60 seconds, say **"Stop."** Mark the last letter with a bracket.]

Note: This is a 60 second timed test.

Scoring

If student:

- Self corrects, write S.C. above letter sound and count as correct.
- Says incorrect letter sound, slash through letter sound, and count as incorrect.
- Hesitates more than 3 seconds, supply the letter sound and count as incorrect.
- Skips letter, circle the letter and count as incorrect.
- Clearly loses his/her place, point to the next letter.

s	D	m	M	H	b	o	k	S	c	10
p	h	e	Z	O	U	z	n	A	T	20
g	J	t	G	N	l	a	r	L	y	30
k	f	I	th	Sh	Ch	z	qu	sh	wh	40
u	w	v	Th	ch	V	Ph	E	g	F	50
f	ph	s	i	X	R	Y	K	u	P	60
d	c	k	S	o	H	b	M	D	m	70
r	n	T	A	U	z	O	e	Z	h	80
a	y	r	L	g	l	G	t	N	J	90
t	sh	qu	wh	z	Ch	th	I	Sh	f	100
Ph	V	u	E	g	F	w	v	Th	ch	110

 # Correct _____

APPENDIX I

FIDELITY OF IMPLEMENTATION CHECKLIST

RITA

Fidelity of Implementation Checklist

A) Teacher used the correct test booklet and student form. ____

B) Teacher adhered to timekeeping procedures. ____

C) Teacher read instructions (and script during intervention) accurately. ___

D) Teacher marked incorrect and skipped words accurately. ____

Total Points _____

APPENDIX J

LANGUAGE ARTS INSTRUCTIONAL LOG

LANGUAGE ARTS INSTRUCTION LOG

1. How much total time did the target student spend on language arts today?

☐☐☐ If 0 minutes, complete question 2.

2. Please mark the reason(s) why you recorded 0 minutes in Question 1 or 2, and then stop here.
(For any of the following items you choose, place an "X" in the corresponding box. Mark all that apply.)

- ☐ Target student was absent
- ☐ I was absent
- ☐ School was not in session (e.g., vacation period)
- ☐ There was a field trip, assembly, visitor, or other special event
- ☐ Target student participated in standardized testing/test preparation
- ☐ Other

3. Approximately how many minutes were the following topics a focus of your work with the target student in reading/language arts today?

	How many minutes for each category?
a. Comprehension.....	☐☐☐
b. Writing.....	☐☐☐
c. Word analysis.....	☐☐☐
d. Concepts of print.....	☐☐☐
e. Reading fluency.....	☐☐☐
f. Vocabulary.....	☐☐☐
g. Spelling.....	☐☐☐
h. 6LJKW wRUG iQVWUXFWLRQ...	☐☐☐
i. Other reading skill....	☐☐☐ Describe_____

APPENDIX K

INTERVENTION SCRIPT

Intervention Script:

Teacher and student sit down at the table where CBM occurs. Teacher will engage the recording feature on the tablet and proceed with the following script:

Teacher says: I am going to share your reading score from last week with you. You attempted_____ words (or letter sounds) per minute – great job! (high fives or fist bumps are acceptable)

Today, I want you to try and match or beat your score from last week. To help you, I am going to highlight the word (or letter sound) that you need to reach to beat last week's score. Are you ready?

Teacher begins to read CBM directions.

APPENDIX L

TEACHER SURVEY

RITA_Teacher

Q1 CBM was easy to administer weekly.

	Completely Disagree	Partially Disagree	Neither Agree or Disagree	Somewhat Agree	Completely Agree
Select one	❍	❍	❍	❍	❍

Q2 I observed improvements with my student's CBM reading throughout the 16 weeks.

	Completely Disagree	Partially Disagree	Neither Agree or Disagree	Somewhat Agree	Completely Agree
Select one	❍	❍	❍	❍	❍

Q3 The CBM grade level was appropriate for my student.

	Completely Disagree	Partially Disagree	Neither Agree or Disagree	Somewhat Agree	Completely Agree
Select one	❍	❍	❍	❍	❍

Q4 The weekly visual data (i.e. graph and aimline) was helpful in determining my student's reading progress towards his or her goal.

	Completely Disagree	Partially Disagree	Neither Agree or Disagree	Somewhat Agree	Completely Agree
Select one	❍	❍	❍	❍	❍

Q6 If provided to me, I will continue to use CBM as a progress-monitoring tool.

	Completely Disagree	Partially Disagree	Neither Agree or Disagree	Somewhat Agree	Completely Agree
Select one	❍	❍	❍	❍	❍

Q8 My student is making adequate progress towards meeting his or her end of the study reading goal (as determined on the graph/aimline).

	Completely Disagree	Partially Disagree	Neither Agree or Disagree	Somewhat Agree	Completely Agree
Select one	❍	❍	❍	❍	❍

Q7 What I liked most about the intervention.

- ❍ Graph/Aimline
- ❍ Weekly CBM
- ❍ Highlighting Word/LS
- ❍ Sharing Data with student

APPENDIX M

STUDENT SURVEY

RITA_Students

Q1 I enjoyed the weekly timed reading sessions.

	Completely Disagree	Partially Disagree	Neither Agree or Disagree	Somewhat Agree	Completely Agree
Select one	❍	❍	❍	❍	❍

Q2 I can now read more words or letter sounds.

	Completely Disagree	Partially Disagree	Neither Agree or Disagree	Somewhat Agree	Completely Agree
Select one	❍	❍	❍	❍	❍

Q3 I can now read faster.

	Completely Disagree	Partially Disagree	Neither Agree or Disagree	Somewhat Agree	Completely Agree
Select one	❍	❍	❍	❍	❍

Q4 I would like to continue weekly timed reading sessions with my teacher.

	Completely Disagree	Partially Disagree	Neither Agree or Disagree	Somewhat Agree	Completely Agree
Select one	❍	❍	❍	❍	❍

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